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Final Environmental Impact Statement

Volume 2 Public Hearing, Comments, and Consultation Letters

Appendices 2-1 through 2-6

**BOMARC MISSILE SITE
McGuire Air Force Base
New Jersey**

**HEADQUARTERS MILITARY AIRLIFT COMMAND
(HQ MAC/LEVC)
Scott Air Force Base, Illinois 62225
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May 1992

92 6 1 173

92-15812



| REPORT DOCUMENTATION PAGE | | | Form Approved OMB No. 0704-0188 | |
|--|-------|--|---|----------------|
| 1a. REPORT SECURITY CLASSIFICATION Unclassified | | | 1b. RESTRICTIVE MARKINGS N/A | |
| 2a. SECURITY CLASSIFICATION AUTHORITY N/A | | | 3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution is unlimited. | |
| 2b. DECLASSIFICATION/DOWNGRADING SCHEDULE N/A | | | | |
| 4. PERFORMING ORGANIZATION REPORT NUMBER(S) N/A | | | 5. MONITORING ORGANIZATION REPORT NUMBER(S) N/A | |
| 6a. NAME OF PERFORMING ORGANIZATION The Earth Technology Corporation | | 6b. OFFICE SYMBOL (if applicable) | 7a. NAME OF MONITORING ORGANIZATION AFCEE ESO/ER | |
| 6c. ADDRESS (City, State, and ZIP Code) 300 N. Washington St., #700, Alexandria, VA 22314 | | | 7b. ADDRESS (City, State, and ZIP Code) Brooks AFB, Texas 78235-5501 | |
| 8a. NAME OF FUNDING/SPONSORING ORGANIZATION AFCEE | | 8b. OFFICE SYMBOL (if applicable) ESO/ER | 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER F33615-90-D-4007 | |
| 8c. ADDRESS (City, State, and ZIP Code) Brooks AFB, Texas 78235-5501 | | | 10. SOURCE OF FUNDING NUMBERS | |
| | | | Program Element No. | Project No. |
| 11. TITLE (Include Security Classification) Environmental Impact Statement for BOMARC Missile Site, McGuire AFB, New Jersey Volumes 1, 2, and 3 | | | | |
| 12. PERSONAL AUTHOR(S) Hastings, T., McKenzie-Carter, M., Ryan, D., Smith, J., et al. | | | | |
| 13a. TYPE OF REPORT Final | | 13b. TIME COVERED FROM 89/11 to 92/5 | 14. DATE OF REPORT (Year, Month, Day) 1992 May 22 | 15. PAGE COUNT |
| 16. SUPPLEMENTARY NOTATION | | | | |
| 17. COSATI CODES | | | 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) Environmental Impact Statement | |
| FIELD | GROUP | SUB-GROUP | | |
| | | | | |
| | | | | |
| 19. ABSTRACT (Continue on reverse if necessary and identify by block number) This document consists of the final EIS report for the BOMARC Missile Site, McGuire AFB, New Jersey. The BOMARC Missile Site became contaminated in 1960 as the result of a fire which partially consumed a nuclear warhead-equipped with BOMARC missile. The EIS evaluates the potential environmental impacts of the various alternatives proposed to affirmatively address the radioactive contamination at the BOMARC Missile Site. Of the alternatives evaluated, the Air Force's preferred alternative is the excavation and off-site disposal of contaminated soils, sediments, and structural materials. | | | | |
| 20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> Unclassified/Unlimited <input type="checkbox"/> Same As Rpt. <input type="checkbox"/> DTIC Users | | | 21. ABSTRACT SECURITY CLASSIFICATION Unclassified | |
| 22a. NAME OF RESPONSIBLE INDIVIDUAL Major John M. Clegg, Jr. P.E. | | 22b. TELEPHONE (Include Area Code) (512)536-9001 (ext. 322) | 22c. OFFICE SYMBOL AFCEE/ ESO/IR | |

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PUBLIC HEARING AND COMMENTS SUMMARY

MAY 1992

PUBLIC HEARING AND COMMENTS SUMMARY

On September 6, 1991, the Draft Environmental Impact Statement (DEIS) for the BOMARC Missile Site, McGuire Air Force Base (AFB) was filed with the Environmental Protection Agency (EPA). During the week of September 13, 1991, a public notice of the DEIS filing was published in the Federal Register. An additional notice announced that a 45-day public comment period on the DEIS had begun, that the Air Force would accept written comments until October 28, 1991, and that a public hearing meeting would be held on October 3, 1991 at the Cookstown, New Jersey Municipal Building to solicit oral and written comments on the DEIS. In addition to the Federal Register notice, the Air Force distributed notification letters announcing the availability of the DEIS and announcing the public hearing to New Jersey media entities, state and federal clearing houses, and the general public. The Air Force distributed numerous copies of the DEIS to local, state, and federal officials, agencies, public libraries, public interest groups, and individuals who had requested copies.

The public hearing was held in the New Hanover Township Municipal Building in Cookstown, New Jersey on the evening of October 3, 1991. A full transcript of the Public Hearing is included as Appendix 2-1.

The public comment period ended on October 29, 1991. Several agencies requested an extension of the comment period. The comment period was extended through January 9, 1992. The EPA and the New Jersey Department of Environmental Protection and Energy requested an interagency meeting to discuss some of the major issues and provide clarification of the written comments provided by these agencies. A meeting was held on January 9, 1992 at the EPA Edison facility in Edison, New Jersey. A complete set of written comments is provided as Appendix 2-2. Public comments have been carefully evaluated and have been incorporated into the Final Environmental Impact Statement (FEIS). Public comments have been categorized according to the specific issue and the categorization system and the numeric codes for each category provided in Appendix 2-3. Appendix 2-3 provides comment summaries and responses to all comments received during the public hearing and the public comment period. Appendix 2-4 provides a cross referencing system to the prior appendices and Appendix 2-5 provides a U.S. Department of Energy summary of the disposition of radioactive materials at the BOMARC Missile Site.

APPENDIX 2-1

TRANSCRIPT OF PUBLIC HEARING

Transcript of Public Hearing

BOMARC MISSILE SITE ENVIRONMENTAL IMPACT STATEMENT

New Hanover Township
Municipal Building
Cockeysville, New Jersey

October 3, 1991

PROCEEDINGS

COL. HESPEL: Good evening, ladies and gentlemen. Welcome to this public hearing on the draft environmental impact statement which discusses alternative methods for addressing the plutonium contamination at the BOMARC Missile Site in the future.

On January 11, 1989, a scoping meeting was held to identify environmental issues, technical questions and concerns that might be involved with the BOMARC Missile Site. Subsequently various studies were conducted regarding those and other concerns relating to the BOMARC Missile Site. A draft environmental impact statement or EIS, and we will be using that term throughout, was prepared.

Now, this hearing is part of the public comment period on the draft EIS. The opportunity for the public to comment on this draft EIS continues until October 28, of this year. Both oral and written comments must be responded to by the Air Force in the final EIS which will be prepared after the comment period closes.

The Air Force has now distributed this draft EIS which addresses five different alternatives for the BOMARC Missile Site in the future and the effects each alternative would have on the environment and public health.

Potential impacts identified in the draft EIS will be addressed in more detail shortly. Now, should you wish to review the draft EIS, copies are available at several public libraries, both in this county and in Burlington County.

If you desire a copy of the final EIS, you may make a specific request, either obtaining one of the speaker cards and Xing in the bottom that you would like it or out at the table in the back and, also, in the beginning of the building written comment sheet, there is, also, a block that you can request a copy of the final environmental impact statement, and that would be mailed to you.

Why are we here this evening? The purpose of this public hearing is to solicit input from public agencies, private organizations and from the public at large on the draft environmental impact statement. Now, this meeting is being held in accordance with requirements of the National Environmental Policy Act and implementing regulations which require federal agencies to carefully analyze potential environmental impacts of certain proposed actions and to use those analyses in arriving at decisions or recommendations as to whether to

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process and how to proceed with a particular action

Now, I have been designated as the presiding officer for tonight's public hearing. My name is Colonel Jim Hessel. I serve as a full-time military trial judge. I want it understood that I am not assigned to McGuire Air Force Base, the 21st Air Force or to Military Airlift Command. I am assigned as the Chief Trial Judge for the Air Force in Washington, D.C.

I am not here as an expert on this draft EIS nor have I had any connection with its development. I am not here to act as a legal adviser to the Air Force representatives who will address these proposals. My purpose is simply to ensure that we have a fair and an orderly hearing and that all people who wish to be heard have a fair chance to speak.

At this time, let me introduce the people seated to my right. Ms. Sharon Geil, the project officer, is from Military Airlift Command from the Environmental Section, and she is located at Scott Air Force Base as her normal office, and to her right is Lieutenant Colonel Edward Maher, from the Armstrong Laboratory, Occupation and Environmental Health Directorate at Brooks Air Force Base, Texas, and our reporter for tonight, for and, Mr. Bob Moore, will be taking down verbatim everything that is said, and this will become a part of the final EIS which is now becoming a part of the Air Force record of decision.

Now, he can only do his job properly if he can hear and understand what you are saying. So, those of you who may be asking questions or wishing to make comments, if you would please be considerate of that fact, I will be asking in those situations that you come to the microphone before you start your questions or your statement after I have recognized you. Also, you will note that the proceedings is being videotaped.

Now, let me say what this hearing is not. This is not going to be a debate nor a referendum or a vote on any of the proposed alternatives. Such things don't add anything to the written hearing record and simply waste your valuable time during this opportunity for your personal input.

The focus of the meeting is on the environmental impacts associated with the alternatives being studied by the Air Force.

So, comments on non-environmental issues should not be raised at this hearing.

What this informal meeting is intended to provide is a continuing public forum for two-way communication about the draft EIS, with a view towards improving the overall decision-making process. Now, notice I said, "Two-way communication." The first part of this

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hearing process has our most knowledgeable folks brief you on the alternatives and their details and the anticipated environmental impacts.

The second part of the process is to give you an opportunity to provide the Air Force information by asking clarifying questions and making statements for the record.

Now, this input ensures that the decision makers may benefit from your knowledge of the local area and any adverse environmental impacts or effects that you think might result from any of the proposed alternatives.

As you came into the auditorium tonight, you came by the table. There were speakers' cards. I indicated if you wished to make a comment or a statement at tonight's meeting, I asked you to fill those out. When the briefings are finished, I will recognize members of the public for the purpose of asking brief clarifying questions on the matters presented here. After the briefings, we will have a short recess so that we can collect any outstanding speaker cards, and so anybody who wishes to speak, if you raise your hand, we will have one of the military members bring you a card or pick up the card from you or you can give it to them at the beginning of the break.

Our order of proceedings will be in three parts, first a summary from Ms. Geil, describing the environmental impact analysis process and then a briefing from Lieutenant Colonel Maher summarizing the environmental analysis and the impacts identified in the process.

Then we will have the clarifying questions, and finally we will go into the public comment by the public at large. Now, elected officials, if we have any elected officials, who wish to speak, they will be given an opportunity to speak first, and then it would be followed by the public at large which would include governmental organizations, public interest groups, as well as individual citizens. Now, speakers from the public at large I would take and shuffle, myself, the cards so that speakers would be chosen in a random method so that each person has the fairest opportunity to speak, and you must fill out a card in order for me to recognize you to get into the random drawing process.

Now, if you don't feel like standing up here tonight and making a statement orally, you do have until October 28, to give us a statement, and you can submit that in writing, either using one of the public written comment sheets or you could put it in writing in a letter or if you have something a lot thicker than that that you would like to provide, you can do that, and you just need to send it to the address listed at the bottom which is Headquarters, Military

Airfield Command, LLEVP at Scott Air Force Base, Illinois.

Written comments are provided or will be considered, I should say, exactly the same as any oral comments that are made here tonight. There is no difference in terms of the impact. They will all be considered to the same important degree. So, we do solicit your comments, and even if you make an oral statement tonight, if you wish to provide further written comments or further written statements to the Air Force, again, you still have the opportunity to do that by sending that to the address.

I would like to thank everyone who turned out tonight and let me assure you that your interest is the primary purpose for us being here to receive your public comments. It is my pleasure now to introduce Ms. Gail who will briefly summarize the draft environmental impact analysis process.

MS. GAIL: Thank you, Colonel Hissel. Good evening, my name is Sharon Gail. I am from the military at the Environmental Management Division at Headquarters, Military Airfield and am the command's project officer for the BOMARC Missile Site. Tonight, I will present a brief explanation of the environmental impact analysis process, explain how this public hearing and your comments fit into the schedule and then provide an overview of the alternate actions proposed for the site.

The Air Force published a notice of intent in the Federal Register to prepare this environmental impact statement in December 1988. In January 1989, a scoping meeting was held to obtain input from agencies organizations and the public on the scope of issues and to identify significant issues related to any of the proposed actions. The draft EIS was prepared in accordance with the National Environmental Policy Act of 1969, or NEPA.

NEPA requires federal agencies to consider the environmental consequences of major federal actions significantly affecting the quality of the human environment. Based on the regulations for implementation of the Act, the Air Force determined that an EIS should be prepared to evaluate the potential environmental impacts of the actions proposed at the BOMARC Missile Site.

The draft EIS was filed with the Environmental Protection Agency on September 6, 1991, and the public comment period continues until October 28, 1991. As explained by Colonel Hissel, if you do not make a verbal statement tonight or have additional input after tonight's hearing, your comments may be sent to this address. They will be accepted until

October 28. Written comment sheets with this address printed on them are available at the registration table for your use. All comments received tonight and prior to October 28, will be addressed. Each will be given equal consideration in evaluating and determining the implementing procedures and mitigation measures the Air Force will take.

If necessary, additional analysis will be performed and the EIS will be changed to reflect the comments received and the results of any new analysis. A response will be provided and printed in the final EIS for all of the comments that are received. The final EIS will be distributed to local libraries and those individuals, agencies and companies that were on our mailing list for the draft EIS.

If you are not on that mailing list and want to receive a copy of the final EIS, you can request a copy from this address or indicate on a comment card that you would like a copy. The final environmental impact statement is scheduled for completion in February 1992. The decision on the preferred alternative implementing procedures and mitigation measures required at the BOMARC Missile Site will be based on input from the draft EIS.

The Air Force record of decision scheduled for completion by April 1992, will include three measures that will be taken to avoid or minimize environmental harm from the selected action. The draft EIS focuses on the biological and physical environment and on the human environment in the context of health and safety. At this point I would like to briefly describe the alternatives proposed for the BOMARC Missile Site.

Colonel Maher will discuss the environmental impacts associated with each of the alternatives after I have introduced them to you. Five alternatives have been addressed in the environmental impact statement. They include unrestricted access, NEPA no action, limited action, off-site disposal and on-site treatment.

The unrestricted access alternative is included as a hypothetical worst-case scenario. This alternative is unique among the alternatives. The Air Force does not consider this to be a reasonable alternative. It is included in the environmental impact statement to provide a method of evaluating the environmental impacts associated with the site free of controls.

As I mentioned, it allows for a worst-case analysis. The NEPA no-action alternative must be evaluated by law. This alternative provides for an assessment of the environmental impacts associated with the management practices currently in place at the site.

If this alternative were selected, the Air Force would continue to manage the site using current site management practices.

The limited action alternative is similar to the NEPA no-action alternative, in that current management practices would, again, be continued. However, under the limited action alternative the Air Force would attempt to locate and remove a missile launcher that is believed to be buried on federal property near the site. The Air Force proposes to search for the launcher under this alternative. There are no guarantees that the launcher would be found. If the launcher is found, it will be disposed of in a properly licensed or permitted radioactive disposal site.

The off-site disposal alternative provides an assessment of the impacts associated with removing contaminated material from the site and disposing of it at a properly licensed and permitted radioactive disposal site. Again, as under the limited action alternative, the Air Force would search for the missile launcher. As before, if the launcher is found, it will be disposed of in a properly licensed or permitted radioactive disposal site.

The final alternative that has been assessed is the on-site treatment alternative. Under this alternative contaminated material would be decontaminated at the site. Depending on the type of material it would then either be returned to the site or disposed of in appropriate local disposal sites after decontamination. Material that cannot be decontaminated will be disposed of at a properly licensed and permitted radioactive disposal site.

Again, the Air Force would search for the missile launcher.

Thank you for your time, and at this point I would like to introduce Lieutenant Colonel Maher who will provide you with some insight into the history of the site and the kind of analyses that have been conducted at the BOMARC Missile Site. He will, also, briefly touch on the environmental impacts associated with each of the alternatives proposed.

Colonel Maher?

LT/COL. MAHER: Thank you, Ms. Gail. I am Lieutenant Colonel Ed Maher. I am Chief of the Bioremediation Engineering Division, Occupational and Environmental Health Directorate of the Armstrong Laboratory at Brooks Air Force Base, Texas. My professional background includes a doctoral degree and board certification in health physics, as well as over 18 years' experience in environmental and radiological protection. My involvement with the BOMARC Site dates back to 1983, which includes Air Force field surveys and technical

review of all contractor reports produced to date.

I would like to provide you some background on the site and to briefly describe the environmental impacts associated with each alternative proposed.

This slide shows the location of the BOMARC Missile Site which is currently inactive. It is located in Plumsted Township and is contained within the Fort Dix Military Reservation on land leased to McGuire Air Force Base. The site contains approximately 218 acres and is located just east of Ocean County Highway 539 in Ocean County. From 1958 until 1972, the BOMARC Missile Site was an air defense missile site housing missiles equipped with nuclear warheads.

On June 7, 1960, a fire occurred in missile shelter 204 on the BOMARC site. The fire partially consumed the shelter, the missile and the warhead. Immediate response efforts included firefighting, removal of major portions of the radioactive weapon components, assessment of initial radioactive contamination levels and engineered residual contamination control measures. The missile launcher which was burned and partially melted is believed to have been removed from the missile shelter as part of the recovery effort. However, the Air Force has not yet conclusively determined the disposition of the launcher. It may be buried on the site. Since the fire, the Air Force has monitored, maintained control of and limited access to the site. The site monitoring has detected contaminants in shallow soils, sediments and structural materials, including the concrete and asphalt apron, the missile shelter and the underground utility bunkers adjacent to the missile shelter. However, the patterns established through in situ surveys and soil samples confirm that the current distribution of contaminants is primarily the result of dispersion caused by the 1960 accident rather than active transport of the contaminants since then.

In January 1989, the Air Force began a remedial investigation and feasibility study of the site. The remedial investigation of the BOMARC Missile Site was conducted to determine the distribution and concentrations of plutonium and americium which is a plutonium decay product in soils, surface water, groundwater, air and structural materials. This was done through a combination of background research and sampling and analysis of the soil, surface water, groundwater, air and structural materials.

Attempts were made during the remedial investigation to locate the missile launcher. An inventory of possible burial sites was conducted and two geophysical techniques,

geologic profiling and ground-penetrating radar profiling were used to survey four areas considered to be the most likely location of the missile launcher.

There are north to northeast of shelter 204, and one is just south of the site perimeter. The surveys located five anomalies representing buried objects which may be the missile launcher.

Part of the remedial investigation, also, included development of a baseline risk assessment. The baseline risk assessment was conducted in order to quantify the risk to human health in the environment. The risks were estimated for both off-site populations and for a hypothetical individual residing on site. The baseline risk assessment used a hypothetical scenario. This is based on the unlikely assumption that due to the long half life of plutonium the Air Force would possibly lose control of the site, that the engineered containment structures currently in place would be neglected, thus provide no containment and that a hypothetical individual would establish residence in the most highly-contaminated portions of the site.

As I said, this scenario was used to obtain the upper bound estimate of risk and is not considered a likely or reasonable exposure scenario. Even using the upper bound estimate, risks to human health are raised only slightly above those incurred if public access is prevented. However, based on these risk estimates, site remedy is warranted if the site were to be released for unrestricted access to the public. Site control including institutional and access controls would, also, be effective in reducing risks by restricting site access.

I would now like to briefly discuss the environmental impacts associated with each alternative proposed. First I will describe how impacts were evaluated and ranked. Then I will summarize the impacts associated with each alternative.

Next, I will discuss the health risks associated with each alternative, and I will finally address how the issues identified during the scoping meeting have been addressed by the draft EIS.

Methods of evaluating the alternatives and of assessing the level of impacts are discussed in detail in the appendices of the EIS. The level of impact was ranked as either negligible, low, moderate or high. In general the level of impact was determined based on the relationship between the impact and some established standard such as a regulatory requirement or a health-based cleanup level established in the remedial investigation feasibility study.

Three alternatives, limited action, off-site disposal and on-site treatment would

include invasive activities that would involve short-term disruption of the environment. Therefore, impacts for these three alternatives were addressed both in the short term, while the invasive activities were ongoing, and in the long term after remedial activities are complete.

One alternative, the NEPA no action does not involve any invasive activities, therefore, short-and-long-term impacts were not distinguished. The unrestricted access alternative assumes that control of the site is lost. So, impacts to the physical environment were assessed assuming first that natural processes would occur and that at some point in the future uncontrolled site development would occur.

In the next few minutes I will give you a summary of the impacts of five alternatives.

Unrestricted access alternative. Under the unrestricted access alternative, the Air Force would lose control of the site, and there would be no remedial measures implemented. The Air Force does not consider this to be a reasonable alternative. It has analyzed the EIS to provide a worst case scenario and address radioactive contamination concerns in the distant future. Since plutonium 239 has a half life of 24,000 years, it is conceivable that the Air Force could lose control of the site before the plutonium decayed. Under this alternative, access to the site would be possible, and the site would be available for a variety of potential uses.

Since the uses of the site are speculative, two scenarios were evaluated. First, for the first scenario, it was assumed that the natural processes of the site would proceed without human intervention. For the second scenario, it was assumed the site would be subject to invasive activities, such as excavation. Under the first scenario the unrestricted access alternative would have negligible impacts to air quality, land use and transportation. However, there would be low impacts to geology, soils and hydrology and to flora and fauna, since the erosion of contaminated soil could increase slightly. This would occur if the concrete apron and the asphalt drainage ditch deteriorated and could no longer contain migration of contamination caused by the erosion. The surface water and groundwater quantities and flow rates would, also, be altered since destruction of the concrete and asphalt would allow increased infiltration and decreased run-off.

Under the second scenario, if the site is subject to invasive activities, there would be high physical impacts to soils since the soil erosion rate could substantially increase, surface and groundwater quality, quantity or flow regime could be adversely altered, and ambient levels

of air pollutants would increase. In addition, floral and faunal habitats and populations could be substantially altered, and the potential for bioaccumulation could be increased. The human resource impacts including the traffic volume and transportation infrastructure could be shared, and there could be moderate impacts to land use if conflicts arise with future uses of land in adjacent jurisdictions. Potential health impacts to the general public and to a potential intruder on the site were, also, assessed. Though the impact would be low to the public, the impact could be high for an intruder, particularly if the launcher could be inadvertently uncovered.

NEPA no action alternative. The NEPA no action alternative represents continuation of current management practices at the site. Implementation of the NEPA no action alternative would include continued institutional control of the site. It would include such things as restricting public access to the site, preventing deterioration of existing containment structures and monitoring the distribution and potential migration of plutonium and americium on site and off site and preventing disturbance of the site.

Implementation of this alternative could have negligible impacts on all of the resource areas evaluated in the EIS except for land use and would effectively mitigate potential health risks through access control. Impacts to land use were estimated to be moderate because future uses of the site for any alternative purpose would not be possible.

Limited action alternative. The limited action alternative is similar to the NEPA no action alternative but, also, involves an attempt to locate the missile launcher. Therefore, impacts were evaluated for the short term while potential sites were excavated and for the long term after excavation activities are complete. Implementation of the limited action alternative would involve excavations and if the launcher is found, disposal of the launcher and associated contaminated soils. This would result in some short-term impacts like generation of fugitive dust as exhausts from vehicles and heavy equipment. However, measures could be implemented to mitigate fugitive dust emissions during excavations and impacts to human health could be negligible. In the long-term, impacts to land use would be moderate because as with the no action alternative, the possibility of use of the site for other purpose would not be possible. Health impacts to the public were estimated and determined to be negligible since access to the site would be restricted.

Off-site disposal alternative. The off-site disposal alternative includes soil excavation, demolition of structures and transport of contaminated materials to a permitted

off-site disposal facility. Soils with contamination levels greater than the acceptable clean-up level would be removed. Excavated areas would be restored by filling and regrading. Different contaminated media would be handled and packaged as appropriate. Impacts were evaluated for both short term during remediation and long term after remediation is complete. Excavation would result in the localized disruption of habitats. Plants would be displaced and the potential for bioaccumulation would increase. Moderate short-term impacts to air quality would, also, occur since there would be an increase in ambient levels of fugitive dust as emissions. In the long term low impacts to flora would result since vegetative succession would occur and the threatened plants that are found in the earlier successional stages may be displaced.

Health impacts for this alternative were determined to be negligible since both this alternative and the next alternative on-site treatment eliminate exposure to contaminants through source removal.

On-site treatment alternative. The final alternative evaluated is the on-site treatment alternative. This alternative calls for removal of radioactive contaminants through physical treatment processes. The method of treatment would depend on the type of contaminated material. Considered in this alternative are methods which physically segregate or concentrate radioactive material thereby minimizing the amount of radioactive waste sent off site for disposal.

Since this alternative, also, involves remedial activities, both short-and-long-term impacts were assessed. There would be short-term impacts to flora and fauna during remediation since habitats would be disrupted. Moderate short-term impacts to air quality would occur since there would be an increase in ambient levels of fugitive dust and emissions. Long-term impacts to flora and fauna would occur since as with the off-site disposal alternative successional change would displace the threatened plants. Health impacts were determined to be negligible since contamination would be removed.

Health risks. All alternatives except the unrestricted access alternative effectively mitigate the risk posed by the site. The NEPA no-action alternative mitigates risk by limiting access to the site through institutional controls. The limited action alternative, also, mitigates risks by limiting access to the site through institutional controls and, also, by removing the missile launcher, if it is located, from the site.

Both the off-site disposal and on-site treatment alternatives mitigate risks while

reducing requirements for long-term institutional controls by reduction of contamination to a site-specific residual level. This level developed from full consideration the risks associated with radionuclide exposure from remaining materials. It is consistent with the current knowledge of the effects of ionizing radiation. The off-site disposal alternative achieves these goals through removal and off-site disposal. The on-site treatment alternative achieves these goals through waste volume reduction and off-site disposal.

One final risk-related issue which I will briefly discuss involves the potential risk in transporting contaminated materials. The relative risks associated with the transportation of radioactive waste have been evaluated in a variety of documents.

In general, previous environmental impact statements which have evaluated the issue relative to the transportation of radioactive waste have concluded that transportation of the waste in compliance with applicable regulations does not pose significant impacts to the environment.

Now, I would like to speak on cleanup issues. I will spend the final few minutes discussing how the public concerns which were identified during the scoping process have been addressed in the draft EIS.

Intelligence have been incorporated into the appropriate alternatives which would decrease potential for transport and dispersion by either wind or water of the contamination and lessen the release of radionuclides during removal actions.

Another scoping issue relates to the potential for the release of plutonium through surface and groundwater media. Since plutonium is a low-solubility metal which adheres primarily to the fine soil particles, the likelihood of contamination being transported through groundwater or surface water is very low.

Identifying a waste depository and transportation of soils and debris were identified as potential problems during scoping. The EIS identified two potential waste depositories. Current provisions of the Low Level Radioactive Waste Policy Act and its amendments caused some concern about the availability of commercial waste disposal sites after January 1, 1992. First commitments to accept radioactive waste generated will play a major role in both the alternatives selected and the schedule for implementation.

As I stated earlier, studies have concluded that the relative risks associated with transportation of radioactive waste in compliance with applicable regulations does not pose a

significant threat to human health or the environment.

Another scoping issue involved the difficulty in entering the BOMARC Missile Site would not be disturbed as long as the health threat from radioactive contamination exists. This was one of the reasons the analysis of the restricted access alternative was developed.

Finally, there were several additional scoping issues related to plants and animals at the site. In response to these issues an extensive literature search was conducted to compile detailed vegetation, habitat and faunal inventories. Research indicated that plutonium released to the environment is not concentrated in terrestrial plants and that the concentration levels are not significant in animals. Analysis of animal tissue from the site showed that levels of plutonium 239 and americium 241 were below the instrument detection limits.

Before I turn the hearing back over to Colonel Ruppel, I would like to explain why the Air Force is still at this point studying a range of alternatives. This is because the Air Force is primarily concerned with protecting human health and the environment at the BOMARC Missile Site. All the alternatives with the exception of the unrestricted access alternative provide that protection.

The BOMARC Missile Site poses a real challenge to the Air Force since the goal of protecting human health and the environment can be achieved in a variety of ways. The choice is not clear-cut and has yet to be made. Your comments this evening will help in making that choice. The Air Force will identify the preferred alternative when the final environmental impact statement is released in February 1992. The time the record of decision is published in April 1992, the Air Force will have made a firm decision as to which course of action will be adopted for the BOMARC Missile Site.

I want to remind you that this is your opportunity to assist the Air Force to reach a decision by providing your comments. I thank you for your attention and would like to turn the hearing now over to Colonel Ruppel.

COL. RUPPEL: Thank you. As I indicated, we will take time to allow you to ask clarifying questions about the matters that have just been briefed to you. You have that opportunity to do so now. I just remind you that you will have an opportunity later to be able to make statements. This is just to clarify comments, and let me, also, ask if we can go ahead and have the lights turned up, now? Thank you very much.

Does anybody have a question where they need something clarified that was

presented? If you do, if you would just raise your hand? In the back, if you would come up here to the microphone, please? There is nothing formal about this. As he is coming up, let me just indicate, even for comments you don't have to have something prepared. Just get up and talk.

State what your name is, and hopefully, that microphone will be turned on. MR. MANDERBUCK: My name is Carter Manderbuck. The question I had was for you. You said that plutonium, it being a heavy metal is not very soluble, therefore presents no hazard entering water tables?

LT COL. MAHER: Groundwater and surface water, right?

MR. MANDERBUCK: So, is that to say that if you poured water through a filter of plutonium of some sort, it wouldn't?

LT COL. MAHER: Very little plutonium would come out the other side of that filter.

MR. MANDERBUCK: Wouldn't that be safe to drink then you are saying? The water would not pose any health threat?

LT COL. MAHER: You have, of course, that all depends on how much plutonium is there and how little water and so on, but that is a difficult question to answer, but it is not readily dissolvable in water, and how much dissolves depends on time and other things.

MR. MANDERBUCK: Okay, the amount of plutonium that is in the ground at the BOMARC site with the rain filtering through there and entering the groundwater, you are saying that that presents no threat?

LT COL. MAHER: Negligible threat.

MR. MANDERBUCK: Okay, thank you.

COL. RUPPEL: Are there any other questions on anything that has been presented?

Dr. if you would come up to the microphone and state what your name is, please?

MR. RYAN: My name is Edward M. Ryan. I represent Mayor Ronald Dancer. I will have a comment later on at the public comment session. I just have a question with regard to leaving the missile launcher. I am from Pleasant Township, of course, and I have contacted a number of our people who were concerned with fighting the fire or responding to the fire, and one of the sites mentioned in a possible site for burial of the missile launcher was

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a then active landfill somewhere in the end of the runway area at McGuire Air Force Base. I had mentioned that at a previous TRC Committee meeting, and I don't know whether that was checked by the methods that you mentioned previously. It was not indicated on your chart here, but one of my people had a recollection, I won't say a sharp recollection, but it was his thought that the missile launcher had been taken to the landfill site, the old landfill site. I don't know where that is located, myself, at this time, and I am sure review of records at McGuire should be able to pinpoint that location.

My second question is from the time of the incident until, for that matter, today, has there been any -- my understanding is there has been no significant migration to the Cohasset(?) aquifer. Am I correct in that statement?

LT COL. MAHER: That is correct.

MR. RYAN: Thank you, I will hold the rest of my comments for the comment period.

COL. RUPPEL: As far as the location of the launcher, is there anything further you can provide on that?

LT COL. MAHER: We can look into that. Thank you.

COL. RUPPEL: Are there any other questions clarifying anything that has been presented?

(No response.)

COL. RUPPEL: Apparently not.

Let us go ahead, and we will take about a 10-minute break here. Let me remind you that if you would like to speak, I ask you to fill out a card. Let me, also, remind you as have the other two people with me here, that we really are soliciting your comments. If you have something that you would like to say, you don't have to have formal, prepared comments. You can get up and state what your mind is. We are looking for any comments that you might have about any of the environmental issues, any of the possible alternatives, anything that you could give the Air Force to help it in its decision-making process, and this is your opportunity. So, I ask you to consider that, and obviously as I have already said, if you don't want to make a comment here, you can either submit written statements or written materials tonight or you can send those to us to the Military Airfield Command receives them by 28 October. We will take about a 10-minute recess at this time.

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(Brief recap.)

COL. HEUPEL: We have three individuals so far. If anybody else while these people are making statements decides that you would, also, like to make a statement, if you would raise your hand or go to the back and we will get you a speaker card and have you fill that out, and just all we need to do is get your name and address and have you go ahead and speak.

Now, hopefully, the microphone will be working, and I ask you to use the microphone, and when you start out, if you would, state your name so that people know who you are and what organization, if any, that you are representing or if you are a public official, what your position is.

What we have got allotted at this point in time is 5 minutes. I will control the time, but frankly, with only three speakers, I will give a little bit more time than that, if that is needed.

What I will do is I will just hold my hand up sometime after the 5 minutes. Now, if we suddenly get a whole lot of people that would like to speak, then I will probably hold tighter to the 5 minutes. If you, also, happen to have prepared comments with you, we would invite you to put them into the box on top of the railing there by the microphone.

At this time, let me call on Mr. Edward Ryan.

MR. RYAN: Good evening, sir. As I stated previously my name is Edward M. Ryan, R-Y-A-N. I represent Mayor Dancer of Plumsted Township who actually is here tonight and had asked me to represent him, and the township since he was not originally able to be present. Plumsted Township's position in this matter is and always has been to leave the missile site alone. There is an old expression that says, "If it ain't broke, don't fix it." We would prefer to leave the site left as it is, with the proper supervision and the additional fencing as described in the report. Needless to say, if the launcher should be discovered buried off the site somewhere and not contained with capping material, obviously something has to be done about that, but insofar as the building and the launch site is concerned, we would prefer to leave it left as it is.

I am a former civil defense director and emergency management coordinator for Plumsted Township. One of my deputies, for years, has conducted unofficial radiation readings in the area. He is a radiation expert, and he has discovered no significant radiation beyond

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normal background radiation. We are satisfied as stated that there is no migration into the aquifer and if that situation continues unless that changes or the site is needed for some national defense purpose or something other than that, Plumsted Township would prefer to leave the, again, to the point of redundancy leave the site left as it is.

Thank you.

COL. HEUPEL: Thank you, sir.

Our next speaker would be Mr. Bob Howell.

MR. HOWELL: Good evening. As you stated, my name is Bob Howell. I am from the New Jersey Pastlands Commission. I want to thank you for having this hearing this evening and the opportunity to speak and I represent the Commission, and I just wanted to state that we support the efforts and the investigation and the clean-up of the site, and we support the off-site disposal alternative, thus eliminating any environmental impacts that could emanate from the site in the future, and we will be submitting formal comments by the October 28, deadline.

Thank you.

COL. HEUPEL: Thank you, sir.

The last speaker that I have listed would be Mr. Michael Tamm.

MR. TAMM: Michael Tamm, resident of Pemberton Township. My question concerns the people of the past who were working there, the people who were stationed there and the people who were there at the time of the accident. I cannot find any studies that have been done so far on these people, and after 31 years I feel some study should be concluded before you take any steps to do anything, and if anything is going to show up, it would show up after 31 years, and there have been many people at that site, and you have to remember that site wasn't closed for almost 10 years, if I am not mistaken, and at the time it was treated as if it was nothing. It was like a circus the next day. So, I strongly recommend before anything is done that studies be done with the people who were there, were stationed there or had to go in and out of there during that period of time.

Thank you.

COL. HEUPEL: Thank you, sir.

Now, do I have anybody else who would like to make a statement or a comment tonight?

Sir, go ahead and come up, and what I will do is I will ask you to fill out a card

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afterward, if that is okay.

If you would, state your name before you begin.

MAYOR DANCER: Yes, sir, Romeo Dancer, Mayor of Plumsted Township. I had not intended on speaking here this evening, but I did, with deference to Ed Ryan. I did want to clarify that I am just here really to learn. This is a gathering for informational purposes, and it would be in my opinion, premature to take a position or a posture at this time without, I mean this is the first meeting that I have ever attended regarding this subject.

So, I wanted to clarify that Plumsted Township governing body, township committee, has not taken any formal position. I can tell you from what I have learned here this evening, however, that for me personally, the first alternative of unrestricted access does seem to me unacceptable. I think obviously we should continue the monitoring protocol that you have, I think presently established, but I do want to on behalf of the governing body say that there is not an official position at this point, and I certainly do respect the comments that Ed Ryan has made. He has been very close to this subject for many, many years, but I felt it necessary to say that we haven't officially taken any position.

Okay?

COL. HEUPEL: Okay, thank you, sir.

Do we have anybody else?

(No response.)

COL. HEUPEL: All right, apparently not.

Again, I know we have said it several times, but you can, there will be 2 weeks left for you to submit written comments. It is listed. You can take one of the speaker cards. Let me double check. No, the speaker card doesn't have the address listed, but the written comment sheet does have the address listed at the bottom of the sheet. Take one of those sheets and if anyone would like one, I believe we have got some in the back. Just raise your hand, and there can be handed out to you, and go ahead and send us any comments that you have.

Ladies and gentlemen, we want to thank you for the comments that you have given us, and those comments some of you have already indicated you will be providing written comments for the Air Force to consider. We appreciate receiving those comments because they do play a major role in shaping any decisions that would be made with regard to these five different alternatives that have been briefed to you.

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We look forward to receiving any additional comments. We thank you for your attention and your attendance. I, also, would like to thank New Hanover Township for the use of this facility and Mr. Martin Poutas for his assistance in setting up the facility for us. Thank you, again, for your comments and interest, and this hearing is adjourned.
(Thereupon, the meeting was concluded.)

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APPENDIX 2-2
PUBLIC COMMENTS

WR-00001(1)



State of New Jersey
Department of Environmental Protection and Energy
Natural and Historic Resources
Division of Parks and Forestry
Office of New Jersey Heritage
CA 404
Trenton, NJ 08613-0404
Tel. 609-292-2023
Fax 609-292-8115

Scott A. Walter
Commissioner

James T. Hall
Assistant Commissioner

08JN-191-145
September 20, 1991

Markus K. Strauss, Colonel, USAF
Executive Secretary
Environmental Protection Committee
Department of the Air Force
Headquarters Military Airlift Command
Scott Air Force Base, Illinois 62225

Re: Ocean County, Plumstead Township
BOMARC Missile Site
Review of Environmental Impact Statement

Dear Colonel Strauss:

Thank you for your request for comment on the potential alternative courses of action relating to the BOMARC Missile Site. As mentioned in the Environmental Impact Statement for the site, any action would be reviewable under Section 106 of the National Historic Preservation Act of 1966. At such time as a preferred alternative is identified, the Office should be contacted in order to conduct further consultation under Section 106.

The contaminated site area is likely to contain National Register archaeological resources, given its size and particular characteristics of the setting. In addition, the missile site complex itself has never been evaluated for National Register eligibility. The radioactive contamination of the site would, of course, be a significant extenuating circumstance in any determination by this Office of appropriate courses of action, relative to Department of the Air Force compliance with Section 106.

New Jersey is an Equal Opportunity Employer
Regarded Here

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WR-00001(2)

Thank you again for your request for comment. If you have any questions please do not hesitate to contact Deborah Finbel of my staff.

Sincerely,

Nancy L. Serpe
Nancy L. Serpe
Deputy State Historic
Preservation Officer

NLS:DMF
ER:drf5:DP911283

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04.06

WR-00002(1)



U.S. Department of Housing and Urban Development
Research Office, Region II
Liberty Park Building
80 Park Place
Newark, New Jersey 07102-3804

October 1, 1991

NO HRC/LEEV
Scott AFB, Illinois, 62225

Gentlemen:

SUBJECT: Draft Environmental Impact Statement
Bomarc Missile Site
McGuire Air Force Base,
Ocean County, New Jersey

We have reviewed the subject Draft Environmental Impact Statement and have no comments to offer concerning the choice of clean-up alternatives discussed in this document.

Thank you for the opportunity to comment on the captioned Draft Environmental Impact Statement

Sincerely,

Michael Stomackin
Michael Stomackin,
Environmental Officer

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WR-00003(1)



Environmental Commission
Township of Jackson

MUNICIPAL BUILDING
P O BOX 881600
JACKSON NEW JERSEY 08527
908 8881200

October 3, 1991

BOMARC/LEEV
Scott AFB, Illinois 62225

Re: BOMARC SITE CLEAN UP

Dear Sir:

The Jackson Township Environmental Commission has reviewed the draft Environmental Impact Statement for the Boeing Michigan Aeronautical Research Center (BOMARC) Missile Site recently received.

Be advised that the Commission is opposed to any disturbance of the site. We recommend the policy of restrictive access and continuing current practices and maintenance with no disturbance of the site until future technology may become available to search for/locate the launcher without excavating the site.

Additionally, the Commission is concerned with the need for off-site air, water and vegetative sampling. As you may realize, the BOMARC site borders with Colliers Mills, a Wildlife Management Area. We feel this area SHOULD be monitored.

Thank you for allowing us to enter our comments on this topic of concern.

Sincerely,

John Finley Jr.
John Finley
Chairman, Pro Tem

/fH

WR-00004(1)

W REED KINDERMANN MD
3004 CHAPEL AVENUE
SUITE 200
CHERRY HILL NJ 08002
TELEPHONE (609) 667-2657

October 11, 1991

Mr. Sharon Cell
Headquarters MAC LEEV
Scott Air Force Base
Illinois, 62225-3001

RE: MISSILE-SITE CLEANUP

Dear Mr. Cell:

I understand from a small article that I read in the Burlington County Times in New Jersey that there is consideration for cleanup of a radioactive site near McGuire Air Force Base that was contaminated in 1960.

It is my understanding that there has been some discussion about possibly leaving the site the way it is even though there is a rocket launcher which has been lost to follow-up and may actually exist in the soil at that site.

What we know about the military history of the handling of these things is that nothing can be trusted. If the records were lost and probably the matter was botched to begin with, there is a very good chance that not only the rocket launcher lies there but also significant amounts of residual plutonium.

If there is plutonium in the sandy soil there and it gets into the water system, this part of South Jersey will make Love Canal appear like Disneyland. In short, any attempt to gloss over this matter by ignoring it or failing to provide a complete cleanup would be an outrage for which the Air Force and U.S. Government would be responsible.

I would like to recommend that the Air Force hire private contractors with specialization in evaluation of radioactive spills to get in there, inventory the matter, come up with recommendations and then proceed. It is pretty obvious that the citizens and towns people in the surrounding area are not expert in this matter and probably not aware of the possible risks that plutonium provides.

As you and I well know, plutonium has a half life of thirty thousand years. Unless this matter is appropriately cared for immediately,

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serious jeopardy could come to a significant group of the local citizenry.

Should you have any questions about my feelings regarding this matter, do not hesitate to contact me immediately.

Sincerely,

W. Reed Kindermann
W. Reed Kindermann, M.D.

WRK:lb

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WR-00005(1)



NEW JERSEY GENERAL ASSEMBLY

ASSISTANT MINORITY LEADER
ROBERT C. SHANN
Democratic County
and Vice President
New Jersey State
Assembly
600-447-4444
Room 200-207-0001

COMMITTEE
WASTE MANAGEMENT, PLANNING
& RECYCLING

October 16, 1991

Scott Air Force Base
Illinois
62225-3000

RE: ROMARC SITE
Fort Dix, NJ

Gentlemen:

I would like to commend the Air Force for the announcement relative to decontamination of the ROMARC site. I believe this site to be potentially the most serious from an environmental and health risk standpoint in Burlington County.

I would endorse the following as a minimum clean up procedure:

1. Locate the launcher and any radioactive components of the incident.
2. Identify the extent of contamination, considering air, soil, surface and groundwater.
3. Fence the contaminated area with adequate buffers.
4. After adequate buffer and fencing "on site" decontamination of the soil should be undertaken.
5. If areas of contamination in air, soil, surface, or groundwater are discovered off site, a health study of any exposed individuals must be undertaken.
6. Continuous monitoring of the site should continue to ensure that no further migration occurs and that decontaminated levels are maintained.

Sincerely,

Robert C. Shann, Jr.
Assemblyman

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WR-00006(1)



DEPARTMENT OF THE NAVY
NAVAL AIR ENGINEERING CENTER
LARGEMOUNT NJ 08733-0000

REF: REFER TO
5090
1823
Ser 1044

23 OCT 1991

From: Commanding Officer, Naval Air Engineering Center
To: Headquarters, Military Airlift Command/LEE. Scott AFB, IL 62225

Subj: ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR THE BOEING MICHIGAN AERONAUTICAL RESEARCH CENTER (ROMARC) MISSILE SITE

1. Thank you for the opportunity to review the subject Environmental Impact Statement (EIS). Having just held our 3rd Public Hearing on our APL cleanup, we understand your interest in receiving feedback concerning the selected action upon review of the subject our comments are as follows:

a. The no further action alternatives presented did not clearly reflect if you intend to continue monitoring the site. Suggest you consider infrequent, but periodic sampling to determine if eventual degradation of the concrete cover will hold any adverse impacts.

b. A comment was made at the public hearing concerning the performance of a health study of those people actually exposed to the site. Recommend this be given consideration before a final alternative is selected.

c. Due to our close proximity to the site, it is naturally in our interest to have the contamination removed. Maintaining site control for 24,000 years simply may not occur.

d. Lastly, we request you pursue further investigations to locate the missing missile launcher. With confirmation of the launcher's location, a continuing adverse impact could be avoided.

2. We again wish to thank you for the opportunity to provide our comments. If you have any questions, please contact either Mr. Robert K. Fitzbryght, Director of Engineering in Public Works at (908) 323-2608 or Ms. Lucy Bottomley, Environmental Branch Head in Public Works at (908) 323-2612.

Lucy S. Bottomley
LUCY S. BOTTOMLEY, P.E.
By direction

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WR-00007(1)



DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT GROUP OF ENGINEERS
CUSTOM HOUSE-2 & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106-5001

OCT 25 1991

Environmental Resources Branch

Ms. Sharon Geil
HQ/LEEV
Scott AFB, Illinois 62225-5001

Dear Ms. Geil:

Thank you for providing us with the opportunity to review the Draft Environmental Impact Statement for the Bomarc Missile Site, McQuire Air Force Base, New Jersey.

Under current Federal Regulations, a Department of the Army permit is required for any actions involving the placement or discharge of dredged or fill material into the waters of the United States and adjacent wetlands. It appears that a cedar swamp habitat exists within the study area and may be impacted under the off-site disposal and the on-site treatment alternatives. As stated in Appendix 4 of the subject report, a Department of the Army permit would be required prior to any site work which may impact this habitat.

Please direct any questions to Ms. Barbara Weirndt of the Environmental Resources Branch at 215-597-6800.

Sincerely,

John A. B. Buser
Robert L. Callegari
Chief, Planning Division

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04.05.03

WR-00008(1)



Plumsted Township Environmental Commission
PO Box 398 New Egypt, NJ 08533 Ocean County 609-758-2241 758-0123 (Fax)

October 25, 1991

Col. Markus Straume
Headquarters, Military Airlift Command/LEEV
Scott AFB, IL 62225-5001

Dear Sir,

Please see the enclosed letter for your information re: BOMARC missile site Plumsted Township, Ocean County, N.J.

Thank you for your time and attention.

Sincerely yours,

Ralph H. Bitter
Ralph H. Bitter
Chairman

WR-00008(2)



Plumsted Township Environmental Commission
PO Box 398 New Egypt, NJ 08533 Ocean County 609-758-2241 758-0123 (Fax)

October 25, 1991

Mr. Gary Vest, Assistant Secretary
FAP-NIC
Washington, D.C. 20330-1000

Dear Mr. Vest,

In response to your request for public comment on the BOMARC Missile Site, please accept the following remarks for the record.

It is the position of the Environmental Commission, taking into consideration the advice of our resident experts, the stability of the site, present and projected, the hydrologic and geologic stability of the region, and the lack of any detectable water or airborne migration of plutonium off-site to date, that the site be maintained in its present state, and be continually monitored.

The "true clean" procedure developed by the Lockheed Corporation appears to be a viable option, but only if:

- 1.) Lockheed can guaranty a near 0% chance of incident at any point throughout their process, and
- 2.) that the plutonium collected does in fact go to the Nevada repository.

We have had communication with Congressman Saxton stating that he will arrange for Lockheed to come to Plumsted and give a presentation about their process. The Environmental Commission and Town Committee welcome the opportunity to cosponsor this event so that we all may become more knowledgeable of the subject.

Sincerely yours,

Ralph H. Bitter
Ralph H. Bitter
Chairman

cc: Nayer Dancer
Congressman Saxton
Col. Markus Straume, Dept of the Air Force

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WR-00009(1)

Board of Chosen Freeholders
Of The County of Burlington
MOUNT HOLLY NEW JERSEY
08060



Frederick F. Galdo, Clerk/Administrator
John Saxton, Jr., Chairman

October 25, 1991

Gary Vest
DAF-NIC
Washington, D.C. 20330-1000

Dear Mr. Vest:

Please accept these comments on behalf of the Burlington County Board of Chosen Freeholders on the alternatives for remediation of the BOMARC Missile Site now being considered by the United States Air Force. The BOMARC Site is maintained by the Air Force on property owned by the U.S. Army at the Fort Dix Military Reservation. While the BOMARC site is not located in Burlington County, the vast majority of the land area comprising the reservation is. The BOMARC site is located in Plumsted Township, Ocean County, immediately adjacent to the Burlington County border. Because of the potential for spread of radioactive contamination in air and ground and surface waters, proper remediation of this site is important to the residents of Burlington County.

The Remedial Investigation/Feasibility Study identified five alternatives for clean up of the BOMARC Missile Site: Unrestricted access; No Action; Limited Action; Off-site Disposal; and On-site Treatment. After studying the alternatives and the environmental impacts associated with each, the Board strongly recommends that the Air Force implement either the Off-Site Disposal or On-site Treatment alternative. Both alternatives would entail location of the missile launcher and removal of contaminated soil to a licensed radioactive waste disposal facility. In addition, the Board encourages that monitoring of soil and water be conducted to accurately define the extent of the contamination and that, over a minimum thirty year period, restricted access to the site be maintained and monitoring of ground and surface water continue to ensure that no further migration of contaminants occurs.

The Freeholder Board commends and supports the Air Force in its efforts to remediate the BOMARC Missile Site. Should we be able to assist you in this endeavor, please do not hesitate to call upon us. Thank you for your consideration of these comments.

Sincerely yours,

Martha W. Berk
Martha W. Berk
Freeholder Director

cc: Board of Chosen Freeholders
Frederick F. Galdo, Clerk/Administrator
Honorable M. James Saxton
Burlington County State Legislative Representatives

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DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
Atlanta GA 30333
October 25, 1991

HQ
MAC/LEEV
Scott AFB, Illinois 62225

Dear Sir:

We have completed our review of the Draft Environmental Impact Statement (DEIS) for the Boeing Michigan Aeronautical Research Center (BOMARC) Missile Site, New Jersey. We are responding on behalf of the U.S. Public Health Service, Technical Assistance for this review was provided by the Radiation Studies Branch, Division of Environmental Hazards and Health Effects, National Center for Environmental Health and Injury Control, Centers for Disease Control.

We have reviewed the Draft EIS for potential adverse impacts on human health. This DEIS addresses the potential environmental impacts of five alternative actions that pertain to radioactive contamination at the BOMARC site. The proposed alternatives are: 1) Unrestricted Access, 2) No Action, 3) Limited Action, 4) Off-site Disposal, and 5) On-site Treatment.

Section 4 of the DEIS discusses the environmental consequences of each alternative. Within each alternative action the issue of public health in terms of exposure to a radiation dose by an intruder at the facility or to offsite populations is discussed. The potential dose, discussed in Appendix 8, to an intruder was estimated by a computer code called RESRAD prepared by Pacific Northwest Laboratory (PWL). The potential dose to offsite populations was estimated using the GENII dose calculation program prepared by PWL.

The doses and risks to offsite populations presented in both section 4 and appendix 8 are reasonable estimates. Although we did not have the access to the input parameters used in the GENII code (Annex 1 of Appendix 8), the information in the text of Appendix 8 presented enough information about the source term for us to run our own dose estimate calculations to offsite populations. Our calculations substantiate the results presented in section 4 of the DEIS regarding dose estimates to offsite populations.

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Page 2 - HQ, MAC/LEEV

Thank you for the opportunity to review and comment on this document. Please ensure that we are included on your mailing list to receive a copy of the Final EIS, and future EIS's which may indicate potential public health impact and are developed under the National Environmental Policy Act (NEPA).

Sincerely yours,

Kenneth W. Molt, M.S.F.S.
Special Programs Group (F29)
National Center for Environmental
Health and Injury Control

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WR-00011(1)

WR-00011(2)



State of New Jersey
Department of Environmental Protection and Energy
Division of Hazardous Waste Site Remediation

CN 028
Trenton NJ 08645-0028
Tel 609-433-1405
Fax 609-433-1454

Scott A. Warner
Commissioner

Karl J. Delaney
Director

25 OCT 1991

Mr. Sharon Gell
HQ MAC/LEEV
Scott AFB, IL 62225-5001

Dear Mr. Gell:

Re: Draft Environmental Impact Statement
BOMARC Missile Site
McGuire Air Force Base, New Jersey

The New Jersey Department of Environmental Protection and Energy (Department) has reviewed the draft Environmental Impact Statement for the BOMARC Missile Site, McGuire Air Force Base, New Jersey, and has the following comments:

1. Section 3.3.3.3: Groundwater Quality

It is stated on page 3-33 that "The groundwater samples (collected by Weston) contained substantial amounts of suspended solids. It is not clear whether the plutonium detected at various times and in varying wells represents samples contaminated with the surface-contaminated soils, or if it reflects the actual presence of plutonium in the groundwater. It should be noted that because plutonium has low solubility and high sorption, it can be transported through groundwater with soil colloids. However, this type of transport is very erratic and difficult to predict. Relatively long-term pumping and sampling would be needed to actually detect its presence in a monitoring well". The report goes on to say that "The pH ranges from 3.5 to 5.5 (Hume et al., 1981). This acidic nature may increase the solubility of plutonium".

It is then stated in the RI/FS that the increase in gross alpha and beta activity is due to leaching of naturally occurring uranium and thorium by infiltration of low pH water in the recharge area in the vicinity of well PC-4. Although this may be occurring to some degree, leaching of plutonium cannot be ruled out.

Additional information regarding the gross alpha and beta activity in groundwater in the Pinelands is needed.

How likely is an upset opportunity scenario?
Residual Risk

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2. Sections 4.1.2.2, 4.3.2.2, and 4.5.2.2.

It is stated that "As discussed in section 3.3.3.3, groundwater sampling and analysis indicated that no radioactivity associated with plutonium could (not) be detected". This conclusion was not made in Section 3.3.3.3. There is a general lack of information regarding the presence of plutonium and its decay products in the groundwater at the site. Although no plutonium was detected in any wells during the latest round of groundwater sampling, it is still not known if its decay products (e.g., alpha particles) are present in the groundwater at the site or if the elevated levels of gross alpha detected in some monitor wells are due to the decay of naturally occurring radionuclides.

The proposed remedial alternatives must include provisions for institutional controls at the site to prevent the use of groundwater should the facility be sold in the future.

Please be advised that the Department will be submitting comments on the Remedial Investigation/Facility Study by mid-November. These comments may contain information that is also relevant to the EIS.

Should you have any questions, please contact me at (609) 633-1455.

Sincerely,

John Barunas
John Barunas, Case Manager
Bureau of Federal Case Management

cc:

Robert Pambianco, McGuire AFB
Jeff Story, DOWPA
Terry Sugihara, BEERA
Ken Koehler, Office of Program Coordination

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above) is that they require a limited amount of disturbance to structures and soils. Accordingly, there will be less short-term opportunities for disturbance/release of contaminants. However, in the long-term, these options require continuous and effective management of the site for many centuries. For a variety of reasons, we do not believe that this can be guaranteed with certainty. In particular, the site is bisected by a county highway. Additionally, it is close to major expanding population centers and it is subject to weather conditions that include significant amounts of rainfall, freeze-thaw cycles, and tropical storms. We believe that these factors acting over the 24,400 year half-life period of plutonium-239 could result in material moving off-site to impact the Elisha Branch, nearby wetlands, and Toms River. Accordingly, we believe that the No Action and Limited Action alternatives are most attractive only as short-term management strategies.

The Off-Site Disposal alternative involves the removal of all contaminated material above the threshold level established in the RI/FS. This alternative would involve the excavation of soils, demolition of Shelter 204 and other structures, removal of casks and contaminated soil underneath and location and removal of the missile launcher. Material would be taken to an appropriate licensed off-site area for disposal. During demolition and removal, a variety of techniques would be employed to limit the release of contaminated dust into the air and local water bodies. After removal of the material, the site would be restored to conditions similar to the surrounding forest.

The On-Site Treatment alternative varies from the Off-Site alternative primarily in that it will employ various methods to remove contamination from the surface of structural materials and the "TRU-Clean" process to remove contamination from the soil. These techniques are intended to reduce the volume of contaminated material before it is removed from the site. Soil processing and surface cleaning or structural elements will be performed in a 20,000 square foot building to be constructed on-site. This building would be operated under a negative pressure with exiting air run through high energy particulate air (HEPA) filters.

The draft EIS indicates that the Off-Site Disposal and On-Site Treatment alternatives include excavation of contaminated soils and ditch sediments as part of the remediation effort. The draft EIS correctly notes that soil erosion may occur during remediation due to movement of wind and water across the site; however, plutonium migration rates and measures to minimize their movement are not discussed. To correct this, documentation should be provided which describes erosion and sedimentation control plans to prevent the transport of

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sediments and attached radionuclides off-site. Additionally, efforts should be made to accurately define the depth of soil contamination on localized portions of the site so that all contaminated material is identified and removed.

While the Off-Site Disposal and On-Site Treatment alternatives require stringent management practices and pollution abatement control measures to ensure that radioactive contaminants are not lost from the site, EPA believes that these alternatives offer the only permanent solution to the problems posed by the contamination. However, should the USAF choose to pursue either of these options, we suggest that, in addition to the control measures already included in the draft EIS, a site-specific contingency plan, consistent with the National Contingency Plan, be considered. The preparation of such a plan should be discussed in future NEPA documents.

Radiation Impacts

An issue of particular concern to EPA is the use of the Nuclear Regulatory Commission's Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors" in determining the threshold limit for deciding what materials can remain on the site. It is not clear whether these guidelines are appropriate to determine the cleanup levels in the remediation of the plutonium-contaminated site. We believe this issue should be addressed prior to the preparation of the final EIS.

The draft EIS does not discuss whether plutonium-239 and americium-241 act similarly in the "TRU-Clean" process. Since all results of the test soils have been evaluated in terms of americium-241 activity, the resultant plutonium 239 activity needs to be established before this system is to be used. In the discussion of soil properties important in plutonium and americium migration, the draft EIS indicates that "plutonium is preferentially bound to silt and very fine sand particles." However, two of the studies cited in Table 3.6 indicate binding of plutonium to clay is virtually equal to its binding with silt and very fine sand. Iron and manganese oxides in soil are strong adsorbents of plutonium and should therefore be characterized to better understand plutonium retention. Accordingly, we recommend that the USAF provide additional soil analysis information so we can properly evaluate plutonium retention at the site. Furthermore, the pH of the soils should be determined to characterize which ionic species is being adsorbed.

The historical plutonium migration velocities cited in the draft EIS are for two specific plutonium compounds (i.e., PuO₂ and Pu(HO)₂). Since no species of plutonium is identified for the BOMARC site, it is unclear whether the plutonium present

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will behave in a similar manner. We believe that this information is necessary to adequately assess the radiological hazard and to evaluate alternative management and cleanup strategies. Accordingly, additional information should be provided which explains what type of material is present at BOMARC and how it compares to historical velocities.

In discussing occupational health, the draft EIS refers to "negligible" levels of radiation. Radiation protection involves the use of a non-threshold linear response curve; therefore, all exposures would have an impact. The "as low as reasonably achievable" (ALARA) philosophy is the appropriate criteria for occupational health and should be considered when developing measures to limit occupational impacts.

As a result of discussions between our staffs, the USAF has provided the baseline risk assessment together with a letter delineating those modifications to this risk assessment that were used to calculate the site-specific soil screening level (SSSL) for the BOMARC site. The USAF has also agreed to accept EPA comments on this aspect of the project beyond the October 28, 1991 draft EIS comment deadline. Accordingly, comments on these important radioactive contamination issues will be provided to the USAF under separate cover no later than November 1, 1991.

Coordination of the EIS and RI/FS

We believe the draft EIS should be a stand alone document. However, in several locations the draft EIS refers the reader to a companion RI/FS for important information about the proposed project. For example, in discussing the Off-Site Disposal alternative, the draft EIS states that, "all materials contaminated above the threshold established in the RI/FS would be removed." Since this threshold level is important to understand the environmental impacts of the various alternatives, it should be discussed in the NEPA documentation as well as in the RI/FS. Additionally, although we do not expect the EIS to contain the same level of detail as the RI/FS, the significant issues discussed in each document should be consistent. Of particular note in this regard, the draft RI/FS discusses several drums containing radioactively contaminated material that may still be on-site; however, the drums are not mentioned in the draft EIS. These differences should be addressed in future NEPA documents.

Based on our review, and in accordance with EPA policy, we have rated the draft EIS as EC-2, indicating that we have environmental concerns (EC) about the proposed project. Specifically, the draft EIS does not identify a preferred alternative nor is it clear that an appropriate cleanup level for the radioactive material has been established. We also believe

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that implementation of the alternatives may impact air and water quality. Accordingly, we request additional information (2) to address these issues.

Thank you for the opportunity to comment. Should you have any questions or wish to discuss this letter, please contact Mr. John Filippelli, Chief, Federal Activities Section, at (212) 264-6723.

Sincerely yours,

Robert W. Margrove
Robert W. Margrove, Chief
Environmental Impacts Branch

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WR-00015(1)

Congress of the United States
House of Representatives
Washington, DC 20515

October 28, 1991

Headquarters, MAC
(HQ MAC/LEEV)
Scott Air Force Base, Illinois 62225

Dear Sir,

An Members of the New Jersey Delegation we are writing to comment on the Draft Environmental Impact Statement on the BOMARC Missile Site and to express our support for environmental restoration and remediation.

We are aware of and support the Air Force's effort to clean up toxic waste sites throughout the country. We believe the nature of the contamination of this particular area demands action sooner, rather than later.

Despite the absence of evidence of active transport of contaminants, the potential of a very serious problem in the future cannot be discounted. Nor can we be assured beyond doubt that the Air Force will remain in control of the site in perpetuity.

It is our understanding of the Draft Environmental Impact Statement that alternatives exist that will eliminate any long-term hazard at the site. We strongly recommend adopting one of these alternatives.

Thank you for your assistance and positive consideration of this important matter.

Sincerely,



J. J. Saxton



Robert A. Roe

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Page 2
October 28, 1991



Matt J. Rinaldo



Frank J. Capri



Mary Loukema




Robert G. Torricelli



Donald N. Payne



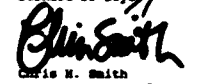
Robert E. Andrews



William J. Hughes



Bernard J. Dwyer



Chris M. Smith



Dean A. Gallo



Richard J. Zimmer



Frank J. Patton

WR-00016(1)



DEPARTMENT OF THE ARMY
HEADQUARTERS, US ARMY TRAINING CENTER AND FORT DIX
FORT DIX, NEW JERSEY
08040-5501



2 OCT 1991

MEMORANDUM FOR Commander, Headquarters Military Airfield Command, ATTN: LEEV
(Sharon Gell), Scott Air Force Base, IL 62225

SUBJECT: Comments on BOMARC Missile Site Environmental Impact Statement

1. Reference 3 October 1991 public hearing on the subject matter

2. Fort Dix comments are as follows:

a. Fort Dix supports the Air Force position not to allow unrestricted access to the area.

b. The whereabouts of missing contaminated materials from the incident site are of great concern to Fort Dix. The Air Force must take every action possible to determine the location of the launcher and any other missing materials suspected to be contaminated. The Air Force should assume full responsibility of proper retrieval and disposition of such materials once they are located.

c. Fort Dix strongly recommends continuous monitoring of the incident area to detect migration of contamination and desires notification of the extent and nature of such migration if it occurs.

3. The Fort Dix POC on this matter is Mr. J. R. Haug, Chief of the DER Environmental Division.

FOR THE COMMISSION:



DAVID L. HEALEY
LTC, US
Director of Engineering and Housing

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The Pinelands Commission

P.O. Box 7, New Lisbon, N.J. 08064 (609)894-9342

October 29, 1991

HQ MAC/LEEV
Scott AFB, Illinois 62225-5001

Attn: Ms. Calliott

Re: App. No. 91-1149.01
Block 91, Lot 1
Bomarc Missile Site
Plumsted Township

Dear Ms. Calliott:

The Draft Environmental Impact Statement for the BOMARC Missile Site has been reviewed by the Commission staff.

The following comments were generated from the review of the report.

1. The Pinelands Protection Act (N.J.S.A. 18A-1 et seq.) and the Pinelands Comprehensive Management Plan (N.J.A.C. 7:50-1.1 et seq.) are applicable or relevant and appropriate requirements as defined by CERCLA. Based on the information contained in the report, only alternatives 4 and 5 are potentially consistent with the requirements of the Pinelands Comprehensive Management Plan.
2. The remediation process proposed through alternatives 4 (off-site disposal) and 5 (on-site treatment) would require the completion of an application with the Commission for a permit equivalency.
3. Wastewater generated through alternative must be treated to comply with the non-degradation standard contained in N.J.A.C. 7:50-6.8(b) prior to any onsite discharge. Alternative 5 would only be consistent with the requirements of the Pinelands Comprehensive Management Plan if the treated soil that is returned to the site is either treated to background levels or it is demonstrated that the treated soil will not degrade water quality or otherwise violate any of the requirements of the Pinelands Comprehensive Management Plan.

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The Pinelands - Our Country's First National Reserve

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4. Restoration of the site following any remediation must utilize soils and plants indigenous to the Pinelands.
5. Uncontaminated demolition materials generated during site remediation cannot be disposed of onsite. No disposal of any radioactive contaminated materials is permitted in the Pinelands Area.

Please notify this office once the preferred alternative is determined to obtain specific application requirements.

Please be advised that the BOWARC site is located in the Pinelands Preservation Area. The Pinelands Commission views the prompt remediation of the site as essential to protect the resources of the Pinelands as mandated by the National Parks and Recreation Act of 1978 and the Pinelands Protection Act.

If you have any questions regarding this matter, please contact Robert Howell of our staff.

Sincerely,

William Harrison, Esquire
Assistant Director

WR/mw

cc: Hon. James Saxton, Member of Congress
Robert Howell
Terrence D. Moore

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State of New Jersey
LEGISLATIVE OFFICES

LEONARD T. CONNORS, JR.
SENATOR—9TH DISTRICT

FORNARD RIVER, NEW JERSEY 08751
609-669-5700
201-240-0266

JEFFREY W. MORAN
ASSEMBLYMAN—9TH DISTRICT
CHRISTOPHER J. CONNORS
ASSEMBLYMAN—9TH DISTRICT

October 31, 1991

Gary Vest
DAF-HIQ
Washington, D.C. 20330-1000

Re: BOWARC Missile Site Remediation/Burlington County

Dear Mr. Vest:

Freeholder Director Martha W. Bark has provided us with a copy of her October 25, 1991 correspondence to you pertaining to the alternatives under review for the clean up and remediation of the BOWARC Missile Site in Plumsted Township.

Although Plumsted Township is no longer located in the 9th Legislative District, this issue is one of serious concern to the neighboring residents of the 9th District who live in both Ocean and Burlington Counties.

Accordingly, by way of this letter, we would like to take this opportunity to express to you that we share fully the strong concerns of Freeholder Director Bark and the Burlington Board of Chosen Freeholders about the potential environmental impacts of this site and of the essential nature of developing a remedial clean up strategy to safeguard the health and well-being of the residents of the area and to prevent further environmental degradation. We concur with the Board of Freeholders that the stringent parameters should be undertaken to remediate this site. These options would be the off-site disposal, the on-site treatment alternative which would include location of the missile launcher and the removal of contaminants for disposal at a certified radioactive waste facility.

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October 31, 1991
Gary Vest
Page 2

Furthermore, we also join with the Burlington Board of Freeholders in urging that enhanced monitoring of soil and water be implemented to determine and prevent further migration of contaminants off-site.

Thank you for this opportunity to provide you with our views and guidance with respect to this important clean up project, and we support the efforts of the U.S. Air Force to remediate the environmental damage of the BOWARC Missile Site at the Fort Dix Military Reservation.

Sincerely,

Leonard T. Connors, Jr.
LEONARD T. CONNORS, JR.
Senator - 9th District

Jeffrey W. Moran
JEFFREY W. MORAN
Assemblyman - 9th District

Christopher J. Connors
CHRISTOPHER J. CONNORS
Assemblyman - 9th District

LTCJR/JWM/CJC/gp1:ddb/91-1465

cc: Martha W. Bark, Freeholder Director, County of Burlington
The Honorable H. James Saxton, Congressman
Members of Burlington County Board of Chosen Freeholders
Frederick P. Galdo, Clerk/Administrator

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WR-00019(1)



State of New Jersey
Department of Environmental Protection and Energy
Division of Responsible Party Site Remediation
CN 028

SCOTT A. WENNER
Commissioner

Trenton NJ 08625-0028
Tel: 609-433-1408
Fax: 609-433-1454

Karl J. Deteney
Director

Ms. Sharon Gell
HQ WAC/LEE
Scott AFB, IL 62225-5001

31 OCT 1991

Dear Ms. Gell:

Re: BOWARC Missile Site
McGuire Air Force Base, New Jersey
Preferred Remedy

The New Jersey Department of Environmental Protection and Energy (Department) has determined that off-site disposal of radioactive waste, without treatment, is the preferred alternative for the remediation of the BOWARC Missile Site.

Please be advised that additional comments on the Remedial Investigation/Follow-up Study will be submitted to you in a few weeks.

Sincerely,

Glenn Barman
Glenn Barman, Case Manager
Bureau of Federal Case Management

h)

c: Steve Boykovich
Robert Paschione, McGuire AFB
Terry Englehart, BEIRA
Jeff Story, BCMA
Ron Koshek, Office of Program Coordination
Robert Wing, USEPA

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II
JACOB H. JAVITS FEDERAL BUILDING
NEW YORK, NEW YORK 10278

NOV 06 1991

Mr. Sharon Gell
BOMARC/LEEV
Scott Air Force Base
Illinois 62225

Dear Mr. Gell:

We have reviewed the additional information provided in support of the draft environmental impact statement (EIS) for the remediation of the BOMARC Missile site. Specifically, the supplementary information that we reviewed includes: the original baseline risk assessment, with the residual radioactivity program (RESRAD) run (August 1990); the original site specific soil screening level (SSSL) document (August 1990); the RESRAD run of the current remedial investigation/feasibility study (RI/FS) baseline assessment (July 1991); the RESRAD run of the EIS Unrestricted Access Alternative Assessment (July, 1991); and recent RESRAD runs verifying previous unit concentration methodology.

Our specific comments on the baseline risk assessment, SSSL, and surface decontamination limits are presented in the enclosure. Additionally, we offer the following comments, which we suggest the U.S. Air Force (USAF) use as action items. Please note that this review supplements our October 28, 1991 comments on the draft EIS. Accordingly, the issues presented here should be fully discussed and addressed in the project's final EIS. Based on our review, we recommend the following action items.

We believe the USAF should determine the dose and risk estimates for the contamination associated with the missing 1,000 to 1,500 grams of weapons-grade plutonium at the BOMARC site. Once this evaluation is made, we recommend that the USAF determine the importance of accounting for the location of this material.

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The USAF should also provide summary tables for data collected during all radiation surveys conducted at the BOMARC site since 1960. We recommend that the tables include: numbers, types, locations, and concentrations for media samples; external gamma exposure rate measurements; descriptions of field and analytical procedures and lower limits of detection; and quality assurance/quality control measures.

The USAF should identify all exposure parameter values (exposure duration, exposure frequencies, intake rates for air, water, soil) and assumptions for the farm family scenario. These values and assumptions should be checked for consistency with those provided in EPA's Office of Solid Waste and Emergency Response (OSWER) Directive 9285.6-03, "Standard Default Exposure Factors" (March 1991). In particular, we suggest that the USAF discuss the discrepancies between parameter values or assumptions presented in the draft EIS and those in the OSWER Directive.

In light of the possible difficulties in modelling "hot spot" contamination at the BOMARC Missile site, we recommend that the USAF clarify the use of RESRAD as an appropriate analytical tool for estimating dose rates and deriving soil cleanup goals. When all input parameter values and assumptions have been identified, the USAF should perform a RESRAD run based on site-specific data (i.e., actual soil concentrations), rather than runs based on normalized unit area or mass concentration data. This should be followed by both uncertainty and sensitivity analyses.

We do not agree with the USAF's suggestion to use the derived BOMARC SSSL of 3.0 uCi/m² as the remediation goal for the BOMARC Missile site. Rather, we suggest the USAF use levels of impact criteria as identified in the draft EIS for air, ground water, and surface water to set the overall site remediation goals for radionuclides in all pathways to a level corresponding to an individual lifetime excess total cancer risk of 10⁻⁶ or less. In a related matter, we suggest that the USAF consult with the Nuclear Regulatory Commission on its plans to develop residual activity criteria which will replace the surface contamination limits specified in Regulatory Guide 1.86.

Further clarification of the baseline risk assessment and RESRAD program is needed, so that we may evaluate the applicability or credibility of the calculations. Specifically, we request a clearer presentation of the default and site-specific parameters used in the RESRAD program.

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Should you have questions specifically dealing with radiation issues, please contact Mr. Paul Giardina, Radiation Program Manager, at (212) 264-4110. Other questions regarding our review of the draft EIS, should be directed to Mr. John Filippelli, Chief, Federal Activities Section at (212) 264-6723.

Sincerely yours,

Robert W. Barrygrove
Robert W. Barrygrove, Chief
Environmental Impacts Branch

Enclosure

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Comments on BOMARC Missile Site -- Evaluation of the Baseline Risk Assessment, Site Specific Soil Screening Level and Surface Decontamination Limits.

I. Baseline Risk Assessment:

1. Apparently, the estimated bulk (e.g. 1000 to 1500 grams) of weapons-grade plutonium (WGP), which was unaccounted for at the time of the accident in 1960, is still missing. This amount of WGP equates to approximately 60 to 86 Ci of Pu-239, 16 to 24 Ci of Pu-240, and 10 to 15 Ci of Am-241. Explanations should be provided on the possible current location of this material and on the potential health impacts associated with exposure to this extremely large quantity of uncontrolled radioactivity. The dose and risk estimates for the BOMARC site, presently based on less than one percent (e.g. seven grams) of the missing WGP, may be substantially underestimated.

2. Significant parts of the data sets are incomplete and/or not fully documented and some discussion of the baseline risk assessment is inadequate. This made it difficult to identify, verify and evaluate key modelling assumptions and parameters such as activity concentrations in environmental media (soil, air, water, biota), the Pu-239/Am-241 activity ratio, source characteristics (area) and vertical extent of contamination, degree of homogeneity, and exposure conditions (duration, frequency). We recommend the inclusions of data summary tables and additional explanatory text.

3. Why, as stated in both the EIS and RI/FS, are the results of the hazard assessments based on the most recent *in situ* gamma radiation surveys done in 1989, when over 30 years worth of data have been collected from 20 or more other surveys at the BOMARC site? *In situ* gamma radiation measurements made with FIDLER or hyper-pure germanium detectors can be used to approximate the areal extent of gamma-emitting radionuclide contamination in soil, at least superficially, provided that (1) there is a large enough source of gamma activity, (2) the photons emitted by gamma-emitting nuclides are of sufficient energy and abundance, and (3) the source is not too deeply buried. These types of measurements cannot, however, be used in the absence of other data (such as borehole logging measurements) to estimate the depth, distribution, or activity concentrations of these radionuclides in soil or any other non-uniformly contaminated source, no matter how well the detectors are calibrated or how carefully the measurements are made. It appears that these types of measurements were used incorrectly in

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the baseline assessments to estimate the depth and mean (areal) concentrations for Pu-239 and Am-241. As a result, we suspect that the dose and risk estimates for BOMARC, which are directly dependent on the depth and concentration estimates, also may be incorrect.

4. "As unit concentration approach employed in the RESRAD modelling runs involves the use of normalized unit mass or unit area concentrations, instead of actual soil concentration data, to calculate dose rates to the maximally exposed individual. The committed effective dose equivalent (CEDE) dose rate estimates, in mrem/yr, resulting from a RESRAD run using this approach must be re-divided by the initial unit area or mass concentration to provide a final result in terms of mrem/yr per uCi/m² or mrem/yr per pCi/m². This approach may be convenient for scaling dose rate estimates up or down depending on soil concentration data selected and, as demonstrated in the SAIC report, leads to equivalent results; in our opinion, however, it is unnecessarily confusing and should be avoided. The most straightforward approach involves the direct use of site-specific soil concentration data and results in a total dose rate estimate that does not require further manipulation. This is the approach used in the recent SAIC RESRAD runs verifying previous unit concentration calculations.

5. According to the Department of Energy's A Manual for Implementing Residual Radioactive Material Guidelines (HSA/CH/8901, June 1989), RESRAD is used to derive guidelines for allowable concentrations of residual radioactive material in soil. It assumes a homogeneous contamination of large areas (several hundred square meters or more) with the distribution of radionuclides averaged over any 100-m² area and depth of 0.15-m-thick layer. As described in the EIS and RI/FS reports, radioactive contamination at BOMARC is non-uniformly distributed over the site in "hot spots", at various depths, and activity levels, and involves structural components of the missile shelter, manholes, soil in the shelter area, asphalt, concrete, and materials and sediments in the primary drainage ditch. While the above referenced manual provides additional guidelines and criteria for dealing with inhomogeneous contamination (see Section 2.3), we found no evidence in either assessment that this guidance was applied. We suspect, therefore, that the RESRAD runs for both assessments fail to model the site adequately and that, as stated on page 81 of the DOE manual, "the presence of hot spots could potentially pose a greater risk of exposure to individuals using the site than the risk associated with homogeneous contamination."

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6. The approach used for the analyses reported in the EIS and RI/FS does not follow the guidance suggested by EPA for risk assessment under the Superfund program. Chapter 10, "Radiation Risk Assessment Guidance", of EPA's Risk Assessment Guidance for Superfund: Volume 1 - Human Health Evaluation Manual (Part A - Baseline Risk Assessment) EPA/540/1-89/002 (December 1989), recommends a two-phase evaluation: (1) estimation of the dose equivalent rate to individuals using ICRP and EPA (Federal Guidance Report No. 11) methodologies to compare dose rate results with radiation protection standards and criteria; and (2) estimation of the health risk to individuals based on the age averaged lifetime excess cancer incidence per unit intake or exposure to compare risk results with EPA's remedial risk range, e.g. 10⁻⁴ to 10⁻⁶ lifetime excess total cancer risk. Exposure parameters (duration, frequency, and intake values) should be consistent with those provided in Risk Assessment Guidance for Superfund: Volume 1 - Human Health Evaluation Manual Supplemental Guidance: "Standard Default Exposure Factors." (Interim Final) OMB Directive 3285.4-03 (March 25, 1991).

7. Why hasn't the soil ingestion exposure pathway been included in the farm family exposure scenario for RESRAD modelling? In the baseline RESRAD runs, why is the calculated dose rate zero at years 50 and 100? Statements made in the RI/FS and EIS suggest that Pu-239 and Am-241 have not migrated to a large extent in soil since their deposition 31 years ago.

II. Site-Specific Soil Screening Level (SSSL): (Comments to the original SSSL (August 1990) and to the SAIC summary report)

- The SSSL of 3.0 uCi/m² calculated for BOMARC should not be as a risk-based remediation goal for the following three reasons:

1. The 1977 proposed EPA guidelines for exposures to transuranic (TRU) elements in the environment (1 mrem/yr to the pulmonary lung or 3 mrem/yr to the bone), which is used as the basis for the SSSL derivation, is not a potential ARAR (applicable or relevant and appropriate requirement). The proposed TRU guidelines have not been finalized by EPA and have not been signed into law by the President. They are still undergoing revision to bring risk methodologies into consistency with current practices, and to ensure that the guidelines are compatible with other guidance under development by the Agency.

2. The soil "screening level" of 0.2 uCi/m² was included in the TRU guidelines, not as a 'de facto'

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standard, but as a conservative estimate of a soil concentration (to a depth of 1 cm) that could reasonably be expected to give rise to dose rates below 1 mrem/yr to the lung or 3 mrem/yr to bone. Its purpose was to reduce the land areas requiring evaluation and to minimize the number of measurements needed. Areas which did not exceed the 'screening level' would generally be considered in compliance with the guidance recommendations; those that exceeded it would require more intensive evaluation to determine actual dose rates to exposed persons. The soil 'screening level' was derived for a hypothetical TRU-contaminated site whose soil characteristics and Pu-239 concentrations were identical to those at the Rocky Flats Plant in Colorado. EPA never intended, nor has it ever recommended, that soil screening levels be calculated for TRU elements on a site-specific basis; and

3. Notwithstanding 1 and 2 above, the SSSL for the BOMARC site was calculated incorrectly. First, the BOMARC SSSL was calculated assuming a contamination depth of 5.1 cm, not 1 cm as used in the EPA soil screening level calculation. Second, implicit in the EPA level was the assumption of soil characteristics identical to Rocky Flats, not to those of the BOMARC site in New Jersey. Finally, the EPA level was based on the assumption of uniform soil contamination (for Pu-239 contaminated particle sizes under 2µm to a depth of 1 cm), whereas the BOMARC level is based on non-uniformly distributed Pu and Am contaminated soil and structural materials at varying depths and activity concentration levels.

III. Threshold Limits for Radioactive Surface Contamination: (Comments to EIS Table 2-1, derived from HRC Reg. Guide 1.06).

- Limits do not account for the depth or volume of contaminated material.
- Limits do not equate to dose or risk levels.
- Procedures and detection limits of instruments may not be sensitive enough to meet the release limits.
- HRC is currently replacing Reg. Guide 1.66 with new residual radioactivity guidelines to account for these deficiencies.

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State of New Jersey
Department of Environmental Protection and Energy
CN 402
Trenton, NJ 08646-0402

Scott A. Warner
Commissioner

November 15, 1991

Colonel Markus K. Strauss, USAF
Director, Environmental Management
DCS/Logistics and Engineering
Department of the Air Force
HQ MAC/LEEV
Scott Air Force Base, IL 62225-5001

RE: BOMARC Missile Site

Dear Colonel Strauss:

The Office of Program Coordination of the New Jersey Department of Environmental Protection and Energy has completed an initial review of the Draft Environmental Impact Statement (DEIS) for the BOMARC Missile Site at McGuire Air Force Base. Our coordinated Departmental review has concluded that the off-site disposal of radioactive waste, without treatment in the preferred alternative for the remediation of the BOMARC Missile Site.

We offer the following comments for your consideration as you proceed with the preparation of the Final EIS and the selection of an alternative.

Radiation Protection

The Radiation Protection Element of the Department is basing its review on the EIS and on a technical support document entitled "Baseline Radiological Hazard Assessment". Please note that this most important document was only sent to the Department within the past week. Based on a cursory review, the following comments should be addressed by the Air Force:

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Minority and Female

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The Department does not agree with the dose objective of 100 mrem/yr for unrestricted access.

There is also disagreement with the Air Force's use of average concentrations. The contamination at the BOMARC site is not uniformly distributed and localized "hot spots" are found around the site. The baseline risk assessment does not adequately address the fact. The doses derived based on uniform distribution would underestimate the risk associated with the use of this land.

The Air Force is not using the latest version of a computer model (RESRAD) which it uses to calculate acceptable doses to the lung and bone.

The Air Force is not consistent in its determination of depth of contamination. It uses 5.1 cm throughout, except when calculating a clean-up criteria in $\mu\text{Ci/g}$. The Air Force uses 1 cm. This makes a very big difference in the final determination of a clean-up criteria.

Staff did not get the same answers when it ran calculations with the same input parameters. An example is the derivation of doses to the lung and bone.

The output of RESRAD is a site specific soil criteria. The Air Force did not use the one calculated by RESRAD. However, you appear to be using an intermediate output of RESRAD, the Dose to Source Ratio (DSR). You take the DSR and then use EPA's soil guidance to determine a clean-up level. The soil criteria calculated by RESRAD is 110 $\mu\text{Ci/m}^2$ for Pu-239. The EPA guidance is 0.2 $\mu\text{Ci/m}^2$. Your criteria was calculated using RESRAD's DSR is 3 $\mu\text{Ci/m}^2$. If the soil criteria from RESRAD was not used, then what justifies your use of the DSR? The discrepancies between these three levels should be explained.

The use of default vs. site specific values as inputs into the RESRAD model should be explained.

There is not a logical progression between the baseline risk assessment and radiation exposure calculations.

The review by the Radiation Protection Element continues. We plan to submit additional detailed technical comments as soon as possible.

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GROUNDWATER

Groundwater Quality (Section 3.3.3.3) -

It is stated on page 3-53 that "The groundwater samples (collected by Weston) contained substantial amounts of suspended solids. It is not clear whether the plutonium detected at various times and in varying wells represents samples contaminated with the surface-contaminated soils, or if it reflects the actual presence of plutonium in the groundwater. It should be noted that because plutonium has low solubility and high sorption, it can be transported through groundwater with soil colloids. However, this type of transport is very erratic and difficult to predict. Relatively long-term pumping and sampling would be needed to actually detect its presence in a monitoring well. The report goes on to say that "The pH ranges from 3.5 to 5.5 (Mean at AL, 1981). This acidic nature may increase the solubility of plutonium".

It is then postulated in the RI/FS that the increase in gross alpha and beta activity is due to leaching of naturally occurring uranium and thorium by infiltration of low pH rainwater in the recharge area in the vicinity of well PUM-4. Although this may be occurring to some degree, leaching of plutonium cannot be ruled out.

Additional information regarding the gross alpha and beta activity in groundwater in the Pineblades is needed.

Sections 4.1.2.2, 4.3.2.2 and 4.5.2.2 -

It is stated that "As discussed in section 3.3.3.3, groundwater sampling and analysis indicated that no radioactivity associated with plutonium could (not) be detected". This conclusion was not made in Section 3.3.3.3. There is a general lack of information regarding the presence of plutonium and its decay products in the groundwater site. Although no plutonium was detected in any wells during the latest round of groundwater sampling, it is still not known if its decay products (e.g., Alpha particles) are present in the groundwater at the site or if the elevated levels of gross alpha detected in some monitoring wells are due to the decay of naturally occurring radionuclides.

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The proposed remedial alternatives must include provisions for institutional controls at the site to prevent the use of groundwater should the facility be sold in the future.

As you probably are aware, there has been procedural confusion in our Department regarding the submission of comments and lead agency coordination. My office is responsible for all Departmental commenting on documents submitted for review to the National Environmental Policy Act. Subsequent to NEPA, we defer to the assigned lead agency within the Department. In this instance there are overlapping responsibilities between the Radiation Protection Element and the Bureau of Federal Case Management in the Division of Responsible Party Site Remediation. My office will convene a meeting to seek resolution of outstanding issues involving the BOMARC site.

In the interim please address all NEPA related correspondence and/or documents to my attention.

Sincerely,

Lawrence Schmidt
Director
Office of Program Coordination

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State of New Jersey
Department of Environmental Protection and Energy
CN 402
Trenton NJ 08645-0402

Scott A. Werner
Communications

December 2, 1991

Markus R. Straume, Colonel, USAF
Director, Environmental Management
DCS/Logistics and Engineering
Department of the Air Force
HQ MAC/LEEV
Scott Air Force Base, IL 62275-3001

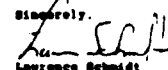
RE: BOMARC Missile Site

Dear Colonel Straume:

The Office of Program Coordination of the New Jersey Department of Environmental Protection and Energy forwarded to you on November 14 preliminary review comments on the Draft Environmental Impact Statement (DEIS), and the Remedial Investigation/Possibility Study (RI/PS) for the BOMARC Missile Site at the McGuire Air Force Base. We offer the attached additional comments from the Department's Radiation Protection Program on the DEIS, the RI/PS and the Baseline Radiological Hazard Assessment for your consideration. (The scheduled comment deadlines for the DEIS and RI/PS were not met because documents, referred to in the DEIS and RI/PS and essential to the review, were not available until after the deadline.)

We again note that our coordinated Departmental review has concluded that the off-site disposal of radioactive waste, without treatment is our preferred alternative for the remediation of the BOMARC Missile Site.

Thank you for giving the New Jersey Department of Environmental Protection the opportunity to review the documents on this important project. We hope that these comments will be helpful during the preparation of the Final EIS, and during the selection of the most environmentally sound course of action.

Sincerely,

Lawrence Schmidt
Director
Office of Program Coordination

Attachment
c: Jill Lipoti

There is an Air Force Opportunity Letterhead Required Page.

#96
03.05



State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF ENVIRONMENTAL QUALITY
C-119
Trenton, NJ 08646-0115
(609) 897-6000
Fax (609) 897-6300

Jill Lipeti, Ph.D. Assistant Director
Radiation Protection Programs

November 21, 1991

MEMORANDUM

TO: Lawrence Schmidt, Office of Program Coordination
THROUGH: Jill Lipeti, Ph.D., Assistant Director
Radiation Protection Programs
FROM: Robert J. Stern, Ph.D., Chief
Bureau of Environmental Radiation
SUBJECT: Comments on BOMARC EIS, RI/FS, and
Baseline Radiological Hazard Assessment

The Bureau of Environmental Radiation has reviewed the Environmental Impact Statement (EIS), the Remedial Investigation/Feasibility Study, and the Baseline Radiological Hazard Assessment for the BOMARC site. The scheduled deadlines were not met because documents essential to the review were not available until after the deadline.

General Comments

The overall organization of the material is poor. The RI/FS is hard to follow because of missing Figures/Plates/Appendices, no explanation of the mathematical manipulation of data, no follow through on calculations, the presentation of similar data in separate sections, and basic conclusions buried in Appendices. The Air Force should try to arrange the material so that it can be reviewed logically without the need to acquire reference documents.

The major comments are associated with the Site Specific Soil Screening Level (SSSL) of 3.0 uCi/m². There are some fundamental problems with the derivation of this level. Changing this value will affect the volume estimates, cost estimates, land use, and environmental consequences.

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Environmental Impact Statement

Section 1 - Purpose and Need for the Proposed Action

"Reports of an examination of the remnants of the warhead conducted at the ORNL after the incident indicated a loss of 1.0 - 1.5 kg of Weapons-Grade Plutonium (WGP). (Battelle Columbus Division, 1989)." The Air Force reports that 4-12 grams have been accounted for based on the radiological investigation and assumes 1 kg is associated with the launcher. If less than 1 kg of plutonium is found to be associated with the launcher, what is the Air Force's contingency plan for locating the remainder?

Section 3 - Affected Environment

The Air Force did not determine the vertical extent of the contamination of the asphalt cover drainage ditch. See comments under the RI/FS. Equating 3 uCi/m² to 187.5 pCi/g seems to be flawed as discussed later under comments on the RI/FS. This will change Table 3-1 on the estimated volume affected by the response objectives.

Appendix A

Section 1.1

A soil ingestion pathway should be included. The default ingestion rate is 36.5 g/yr. Without this pathway, the ingestion dose could be underestimated.

Section 2.1.1

Deriving cleanup criteria using a uniform concentration is not appropriate at this site. See comments under the Baseline Radiological Hazard Assessment.

Could resuspension rates have been more site specific, considering the dry, sandy soil indigenous to the Pine Barrens, rather than using the geometric mean of a range of resuspension rates for lightly vegetated soil?

The Air Force diluted the effect of the 7,118 m² area by averaging 63 uCi/m² with the 21,470 m² area that averages only 0.3 uCi/m². What is the explanation for this dilution?

The release rate calculated is not the same used in the GENII run in Appendix J. The source term input is 74 uCi/yr instead of the 915 uCi/yr calculated using the "unit" concentration. Were the results then scaled by 28 instead of 15.9?

Why did the Air Force choose 100 area/yr as input to RESRAD for an acceptable dose for unrestricted access, when the EPA based guideline dose rates are based on 4 area/yr?

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Remedial Investigation/Feasibility Study (RI/FS)

Section 3 - Field Investigation Program

Was the culvert under Route 518 sampled to determine contamination?

What is the explanation of the anomalous ground water data in the north east section of the site? Historical data indicates soil contamination, while recent data does not show contamination. This suggests that historical data should be included in the evaluation of the contamination.

Why didn't the Air Force determine what nuclide was causing the gross alpha to be elevated in well PU-7? They determined it was not plutonium, but did not investigate further.

The FIDLER survey instrument's estimated sensitivity is 0.3 uCi/m². However in Table 4-22, the activity reported using the FIDLER instrument is lower than 0.3 uCi/m².

Section 4 - Results and Significance of Findings

P. 4-37 Were the RESRAD results scaled? Whenever results are scaled, this should be shown clearly in the RI/FS. This is a problem throughout the document and Appendices. Conclusions reported in Appendix B should be included in this section as well to make reading/reviewing easier.

Reference Plates are missing from the RI/FS. Are they in a separate document?

P. 4-157 Were the GENII results scaled? Scaling results should be clearly shown in calculations. Also see comments under Appendix J. Are the values in Table 4-40 scaled? It appears that they are, but again there is no explanation or examples showing this scaling factor.

Section 5 - Alternative Remedial Measures

The site-specific risk-based goal for remediation should not be 3.0 uCi/m². See comments under the Baseline Radiological Hazard Assessment.

The Air Force seems to change back and forth between 1 cm and 5.1 cm when converting from pCi/g to uCi/m² and vice versa with no explanation.

P. 5-3 What is the explanation for using a depth of 1 cm to convert 3.0 uCi/m² to pCi/g when throughout the RI/FS the Air Force uses 5.1 cm? Substituting 5.1 for 1 cm results in a clean-up level of 36.6 pCi/g vs. 187.5 pCi/g as calculated by the Air Force. Obviously

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using 1 cm is not "conservative" as indicated. Also, the Bureau of Environmental Radiation questions the use of 5.1 cm for depth of contamination based on the Air Force's statement "The depth of plutonium contamination greater than the risk-based cleanup level for 3.0 uCi/m² was generally less than one foot across the site."

In one area of the asphalt-covered drainage ditch off the concrete apron, the vertical extent of Pu contamination was not determined, but extended to a depth of at least 18 inches. Using the results of a soil boring twenty feet from this location can not be used to justify the absence of contamination below two feet in this location.

Page 5-18

Although we do not consider these contaminants to be Low Level Radioactive Waste (LLRW), the New Jersey Low Level Radioactive Waste Disposal Facility Siting Act prohibits the construction of a LLRW disposal site in the Pinebluffs, and thereby could be construed as a State policy regarding the disposal of other radioactive waste in the Pinebluffs. In light of this, why does the Air Force present on-site disposal as an option?

As stated in this Appendix, there is much uncertainty associated with the modeling, specifically the weather conditions, height of release, and material available for release. There also is great uncertainty in the validity of the FIDLER readings (measurement and calibration procedures, definition of the lower limit of detection, etc.) as reported on page 8. Now, then could one of the Air Force's conclusions be: "The fact that well defined patterns were predicted by RESRAD 1.0, and none were found, argues that no measurable ground contamination occurred from the Pu plume released during the fire." This sentence should be eliminated from the text. It appears the only conclusion to be drawn is that no conclusion could be reached from this exercise.

All the Figures in Appendix A of this Appendix are missing.

Appendix J

This entire Appendix lacked sufficient information to perform a comprehensive review. In future revisions, please explain all derived dose rates and show calculations. See comments under Baseline Radiological Hazard Assessment.

The use of default vs. site specific values as inputs to RESRAD should be explained.

The GENII source term input (74 uCi/yr) is not consistent with that calculated in Appendix B of the EIS (915 uCi/yr). This discrepancy should be corrected or explained.

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WR-00023(1)



United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, DC 20540

ER 91/853

DEC 4 1991

Colonel Markus E. Straume
Department of the Air Force
Scott Air Force Base, Illinois 6222-5001

Dear Colonel Straume:

The Department of the Interior has reviewed the draft environmental impact statement, BOMARC Missile Site, McGuire Air Force Base, New Jersey, and has the following comments.

General

The Department is pleased to see the U.S. Air Force's proposed action to address and resolve radioactive contamination at the BOMARC site. Further, it is encouraging to see the attention given to producing a comprehensive ecological inventory of the area and the Air Force's assurance that any environments impacted during remediation will be restored to their pre-disturbance status (i.e., recontoured and revegetated with flora indigenous to the region).

Biological Transmission of Plutonium

The discussion on biological transmission of plutonium (Section 3.5.5) neglects to include potential assimilation of radioisotopes by small mammals (e.g., shrews, mice, moles, etc.) or their predators (e.g., hawks and falcons). A review of the scientific literature available on trophic transport of the radioisotopes of concern (similar to the discussion which is provided in section 3.5.5 for the transfer of radioisotopes from plants to herbivorous organisms) would be appropriate. That type of review should assess various routes of contamination for small mammals (dermal contact, soil ingestion, etc.), the overall significance of the current soil contamination to small mammals, and the significance of food chain transfer of radioactive contamination to avian predators. This is particularly important due to the fact that the planned biological sampling at the site, which would address the bioaccumulation concern directly, was largely unsuccessful (only one organism was obtained for analyses).

Compliance With the Endangered Species Act

The Air Force should consult informally with our U.S. Fish and Wildlife Service pursuant to Section 7 of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

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Since the cited 1989 correspondence between the Air Force and the Service, Knieskorn's beaked reed (Rhyngospora knieskornii) has been listed as a threatened species (final rule published in *Federal Register*, July 18, 1991) and American cheffed (Schweizer Americana) has been proposed to be listed as endangered (proposed rule published in the September 11, 1991 *Federal Register*). Both of these species occur in the New Jersey Pinelands and may be within the vicinity of the project area. Informal consultation will help determine that possibility.

An up-dated request for Section 7 Consultation will help ensure protection of all fauna and flora currently on the List of Endangered and Threatened Wildlife and Plants. For technical assistance on Section 7 Consultation under the Endangered Species Act, please contact the Field Supervisor, U.S. Fish and Wildlife Service, New Jersey Field Office, 927 W. Main Street (D-1), Pleasantville, New Jersey 08232 (telephone 609-646-9310).

We hope these comments will be helpful to you.

Sincerely,

Jonathan P. Deason
Jonathan P. Deason
Director
Office of Environmental Affairs

#127
04.04.03

WR-00024(1)



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, NEW YORK 10278

DEC 09 1991

Ms. Sharon Geil
BOMARC/LEEV
Scott Air Force Base
Illinois 62225

Dear Ms. Geil:

The Environmental Protection Agency (EPA) - Region II has reviewed the draft Remedial Investigation/Feasibility Study (RI/FS) for the BOMARC Missile Site at McGuire Air Force Base. The RI/FS presents the results of studies and evaluation of the U.S. Air Force's (USAF) alternatives for the remediation of radionuclide contamination from a June 7, 1960 explosion and fire that occurred in Shelter 204.

EPA's comments on the draft RI/FS for the BOMARC site are enclosed; these comments are broken down by specific program area. Please note that this review supplements both our October 28, 1991 comments on the draft environmental impact statement (EIS) and our November 6, 1991 comments on the baseline risk assessment and radiological modelling results for the BOMARC site. Although most of the comments specifically deal with the RI/FS, certain comments elaborate on issues previously addressed (e.g., soil screening levels and risk assessment assumptions). These are noted where appropriate.

As you requested, we are scheduling a meeting to discuss our comments on both the EIS and RI/FS. The meeting is tentatively scheduled for January 9, 1992 at our offices in Edison, New Jersey. We will contact you in the near future to confirm the meeting date and time.

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In the interim, if you have questions, please contact John Filippelli or Robert Wing of the Superfund Federal Facilities Section at (212) 264-6723 or -8670, respectively.

Sincerely yours,

Robert W. Margrove
Robert W. Margrove, Chief
Environmental Impacts Branch
Enclosure

#128
01

U.S. Environmental Protection Agency-Region II

Comments on the Draft RI/FS for the BOMARC Missile Site

Air Pollution Control

Section 3.4.3.3

On-site Treatment entails treating excavated soils using the Tru-Clean® process or a similar process and restoring the site by backfilling the "clean" fraction from the Tru-Clean® process and other clean fill as needed. It is important to recognize that in addition to radioactive constituents, volatile organic compounds (VOC) have been identified in soil at the site. If this alternative is the selected remediation, EPA recommends that appropriate air modeling be performed to estimate the air quality impacts of VOCs that may be released during operation of the Tru-Clean® process or that remain in the soil used for backfill.

Similarly, the extent and nature of chemical contamination and the effects that such contamination may have on remediation efforts should be clarified (e.g., problems that the presence of VOCs may create if the On-site Treatment option is ultimately chosen). This is especially important in regard to the final characterizing of the wastes generated for disposal.

Section 5.1.1.3.2

In the Action-Specific Requirements on Page 5-18, it is stated that prevention of significant deterioration (PSD) regulations may be an applicable or relevant and appropriate requirement (ARAR) for the site. It should be noted that radionuclides are no longer PSD affected pollutants. Of course, PSD may be applicable to activities at the site which may lead to significant air emissions of any other PSD affected pollutant. However, given the potential remedial activities described and the small area covered by this site, it appears unlikely that this would occur.

Other

Due to the risks involved, comprehensive measures must be taken to suppress dust generated during excavation and treatment. We recommend that a dust control plan be included in future documents.

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The federal and state regulations governing hazardous waste piles and landfills are aimed at control of wind entrainment and dispersal of dust. Any waste piles of contaminated material at the site should be treated in a manner consistent with the requirements of these regulations, including: RCRA Standards for control of fugitive dust emissions 40 CFR 264 Part 251 (Design and operating requirements), Part 254 (Monitoring and inspection), and Part 301 Subpart H (Landfills: Design and operating requirements); and RCRA 754 Solid Waste Regulations Part 754-10.9 (Hazardous Waste Landfills). Most of the treatment options and all of the disposal options envision some excavation. Every available precaution should be undertaken to prevent wind dispersal of the radioactive material.

Groundwater

Pages 2-12 and Figure 2-4

It is asserted on Page 2-12 that the groundwater flows across the site to the east and southeast. However, the groundwater flow direction implied by the groundwater elevations shown in Figure 4-2 and stated on Page 4-4 (in a northeast direction) appears to contradict this assertion. As the RI/FS states, groundwater flow information is inconclusive since there is insufficient data regarding flow directions in at least wells PU-2 and PU-4. Accordingly, further definition of flow direction is needed.

Similarly, there appears to be inadequate groundwater monitoring coverage in the southwest portion of the site near Highway 539 and southeast from the ponding area where runoff from the site collects. Construction of additional wells in these areas would aid in determining flow direction and help to delineate contaminant migration southwest of the groundwater divide.

Page 2-14

It is stated that "the water supply wells on the BOMARC facility are not currently being used for any purposes." Information regarding the maintenance of these wells should be included in the RI/FS, or the wells should be abandoned according to appropriate standards (i.e., EPA's "Manual of Water Well Construction Practices" or other state or local regulations/guidance). Such action will prevent the wells from providing conduits for subsurface contamination.

Also on Page 2-14, information is provided on groundwater uses based on the 1969 reporting year. More recent data should be included, particularly for the Naval Air Engineering Center - Lakshurst.

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Additionally, a thorough search should be conducted for the well that was reportedly used as a disposal well for the "various fluids", as this could contribute to any organic contamination detected in the groundwater.

Page 3-2

Geophysical surveys were conducted in only four areas, but no explanation was given for the choice of these four areas. We are particularly interested in clarifying whether the areas not surveyed have no buried drums.

Pages 3-22 to 3-23

An explanation should be provided in this section as to why background soil samples were not analyzed for the complete set of analytes as were other samples.

Section 4.1.3

The report indicates inconsistencies in determining the activity patterns of the site related contaminants due to either contaminant migration from the source area or due to a groundwater recharge area centered near monitoring well PU-4. The Earth Technology Corp. notes that well coverage in the northeastern portion of the site is insufficient to draw any conclusions as to the reason for lowered radioactivity near MW-48. EPA recommends additional wells to the northeast of MW-48 to further characterize the groundwater activity trend in this location.

Tables 4-5 and 4-6

The hypothesis by Earth Technology suggests that suspended sediments have contributed to unusually high concentrations of total aluminum and iron, not typical of the Pinelands region. According to the RI/FS, the filtered samples taken were depicted as turbid due to inconsistent filtration efficiency. Therefore, the data representing metal concentrations in Tables 4-5 and 4-6 are not representative of the site and are considered invalid. However, there was no mention that follow-up sampling would take place as a result. Follow-up filtered sampling is recommended to ensure that the actual metal concentrations are below regulatory limits.

Table 4-24

The 14 soil borings terminated at depths of 10 feet or less even though the water table is 20 to 50 feet below the surface at the site. Also, the results in Table 4-24 indicate that soil from 7 of the borings exhibited counts per minute (cpm) values at the bottom of the borehole that were equal to or greater than the cpm

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values at shallower depths. For this reason, we recommend soil analysis down to the water table to more accurately determine the potential for migration. Also, it should be stated whether the values cited (ca. 100-200 cpm) are considered to be background levels.

Section 4.1.3.2.1

This section indicates the unlikelihood that the drainage ditch north of Shelter 204 has contributed to off-site contamination. The point of intermittent high radioactivity near the northeastern boundary of the facility may imply that this assumption is incorrect. Additional surface water and surface soil samples northeast of monitoring wells MW-48 are recommended to confirm that plutonium is not migrating northeast via surface water runoff.

Other

As stated in the RI/FS, it has yet to be determined if any natural or man-made surface drainages, underground drainage conduits or tunnels which could influence surface recharge and underground flow direction exists. EPA recommends that such an investigation be conducted.

Planning for the treatment and disposal of plutonium-bearing soil should take into account recent work on facilitated transport of contaminants attached to colloids. For example, trace amounts of plutonium and americium were found attached to colloids almost two miles from a Los Alamos National Laboratory site where the radionuclides had been treated and disposed. (See W.R. Penrose et al., *Environmental Science Technology*, 24, Vol. 24, 1990, and the July 1991 "Environmental Research Brief - Facilitated Transport of Inorganic Contaminants in Ground Water, Part II: Colloidal Transport" (EPA/600/R-91/040).)

Hazardous Waste (RCRA)

RCRA regulated constituents were tested for in the soil groundwater at the site. The levels appear to be below the federal and state action levels as specified in draft RCRA corrective action regulations and guidance. The relation of these sampling results should be clearly indicated in the Executive Summary and other appropriate sections of the report.

Future analytical work at the site should include retesting for RCRA and TSCA regulated constituents, including Toxicity Characteristics Leaching Procedure (TCLP), to confirm their presence or absence.

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Radiation

Executive Summary: Section 22-4

It is unclear whether the drums located by magnetic profiling are suspected of containing plutonium contaminated wastes. A determination should be made as to the type and level of contamination present (if any) and, if present, provide dose and risk estimates for this material.

Section 1.4

Figures 1-2, 1-3, and 1-4 referred to in this section are missing.

Section 1.4.1

Efforts should be undertaken to determine the location of the earthen dam. Also, it should be determined where the material from which it was constructed was deposited once fire fighting efforts ceased.

Section 1.5.4

It is stated on Page 3-20 that, "Background was established several times daily by taking readings in uncontaminated areas." The location at which these readings were taken should be specified.

Section 1.6.1

There is a scarcity of sampling data for the two culverts on the BOMARC site. The extent of contamination should be determined, in addition to effects that this may have on the amount of material requiring remediation.

Section 1.6.2.3.3

Samples (corings) should be obtained to determine the extent of contamination in the base of the bunker.

Section 1.6.2.4.4

Sieving particles into >20 microns and <20 microns size does not adequately address the respirability of Pu contaminated materials. Particles of <10 microns are particularly respirable into the bronchioles and alveoli.

Section 4.1.3.6.2

Elimination of four positive values near the accident site, because little aerial deposition was expected in this particular area, may not be a valid determination. Instead, these values

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should only be eliminated based on the results of appropriate sampling and analytic techniques.

The statement that "the exact amount of plutonium in the warhead is not available" should be clarified. It should be stated if the information is classified. If there is some discrepancy as to the amount of material originally in place within the warhead, the validity of the 12 kg of Pu estimate, used as a modelling assumption, should be determined.

Section 4.1.3.8.3

The vertical extent of contamination at Station 001-SI-153, which is a "high activity zone", should be determined. Samples collected at this station have exceeded 100,000 pCi/gm.

Section 4.1.3.8.8

The "energy ranges of interest" should be identified.

Figure 4-38

Very little sampling has been done in the bunker area (#3067) although this area consistently shows activity levels in excess of EPA's soil screening level (0.2 uCi/m²). Further sampling may be required at this location.

Section 4.1.8.1

The 3.0 uCi/m² calculated site-specific soil screening limit (SSSL) is identified in this section, and used subsequently throughout the RI/FS. As with our earlier comments, we recommend that instead of this derived limit, ARARs be used for air, ground water, and surface water. An overall site remediation goal, for all radionuclides in all pathways, should be set to a level corresponding to an individual lifetime excess total cancer risk of 10⁻⁶ or less. Specifically, the SSSL of 3.0 uCi/m² calculated for BOMARC should not be used as a risk-based remediation goal for the following reasons.

1. The 1977 proposed EPA guidelines for exposures to transuranic (TRU) elements in the environment (1 mrad/yr to the pulmonary lung or 3 mrad/yr to the bone), which is used as the basis for the SSSL derivation, is not a potential ARAR (applicable or relevant and appropriate requirement). The proposed TRU guidelines have been neither finalized by EPA nor signed into law by the President. They are still undergoing revision to bring risk methodologies into consistency with current practices, and to ensure that the guidelines are compatible with other guidance under development by EPA.

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2. The 0.2 uCi/m² soil "screening level" was not included in the TRU guidelines as a 'de facto' standard, but rather as a conservative estimate of a soil concentration (to a depth of 1 cm) that could reasonably be expected to give rise to dose rates below 1 mrad/yr to the lung or 3 mrad/yr to bone. Its purpose was to reduce the land areas requiring evaluation and to minimize the number of measurements needed. Areas which did not exceed the 'screening level' would generally be considered in compliance with the guidance recommendations; those that exceeded it would require more intensive evaluation to determine actual dose rates to exposed persons. The soil 'screening level' was derived for a hypothetical TRU-contaminated site whose soil characteristics and Pu-239 concentrations were identical to those at the Rocky Flats Plant in Colorado. EPA never intended, nor has it ever recommended, that soil screening levels be calculated for TRU elements on a site-specific basis.

3. Notwithstanding points 1 and 2 above, the SSSL for the BOMARC site was calculated incorrectly. First, the BOMARC SSSL was calculated assuming a contamination depth of 5.1 cm, not 1 cm as used in the EPA soil screening level calculation. Second, implicit in the EPA level was the assumption of soil characteristics identical to Rocky Flats, not to those of the BOMARC site in New Jersey. Finally, the EPA level was based on the assumption of uniform soil contamination (for Pu-239 contaminated particle sizes under 2 μm to a depth of 1 cm), whereas the BOMARC level is based on non-uniformly distributed Pu and Am in the soil and structural materials at varying depths and activity concentration levels.

Section 4.1.8.2.1

We recommend analysis of "the point of intermittent high activity" identified near the northeastern boundary of the facility.

Section 4.1.8.3 and applicable subsections

A review of the baseline risk assessment/radiological hazard assessment has identified the following areas of concern:

1. Apparently, the estimated bulk (e.g. 1000 to 1500 grams) of weapons-grade plutonium (WGP), which was unaccounted for at the time of the accident in 1960, is still missing. This amount of WGP equates to approximately 60 to 86 Ci of Pu-239, 16 to 24 Ci of Pu-240, and 10 to 15 Ci of Am-241. Explanations should be provided on the possible current location of this material and on the potential health

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impacts associated with exposure to this extremely large quantity of uncontrolled radioactivity. The dose and risk estimates for the BOMARC site, presently based on less than one percent (e.g., seven grams) of the missing WGP, may be substantially underestimated.

2. Significant parts of the data sets are incomplete and/or not fully documented, and some discussion of the baseline risk assessment is incomplete. This made it difficult to identify, verify and evaluate key modelling assumptions and parameters, such as activity concentrations in environmental media (soil, air, water, biota), the Pu-239/Am-241 activity ratio, source characteristics (areal and vertical extent of contamination, degree of homogeneity), and exposure conditions (duration, frequency). Accordingly, we recommend the inclusion of data summary tables and additional explanatory text.

3. It is not clear why the results of the hazard assessments are based on the most recent in situ gamma radiation surveys done in 1989, when over 30 years of data have been collected from 20 or more surveys of the BOMARC site. In situ gamma radiation measurements made with FIDLER or hyper-pure germanium detectors can be used to approximate the areal extent of gamma-emitting radionuclide contamination in soil, at least superficially, provided that (1) there is a large enough source of gamma activity, (2) the photons emitted by gamma-emitting nuclides are of sufficient energy and abundance, and (3) the source is not too deeply buried. These types of measurements cannot, however, be used in the absence of other data (such as borehole logging measurements) to estimate the depth, distribution, or activity concentrations of these radionuclides in soil or any other non-uniformly contaminated source, no matter how well the detectors are calibrated or how carefully the measurements are made. It appears that these types of measurements were used incorrectly in the baseline assessments to estimate the depth and mean (areal) concentrations for Pu-239 and Am-241. As a result, we are concerned that the dose and risk estimates for BOMARC, which are directly dependent on the depth and concentration estimates, may also be incorrect.

4. The unit concentration approach employed in the RESRAD modelling involves the use of normalized unit mass or unit area concentrations, instead of actual soil concentration data, to calculate dose rates to the maximally exposed individual. The committed effective dose equivalent (CEDE) dose rate estimates, in mrem/yr (resulting from a RESRAD run using this approach) must be re-divided by the initial unit area or mass concentration to provide a final result in

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terms of area/yr per uCi/m² or area/yr per pCi/m². This approach may be convenient for scaling dose rate estimates up or down depending on soil concentration data selected and, as demonstrated in the SAIC report, leads to equivalent results. However, in our opinion it is unnecessarily confusing and should be avoided. As suggested in our November 6, 1991 letter regarding the review of radiological surveys and baseline risk assessment for the BOMARC site, the most straightforward approach involves the direct use of site-specific soil concentration data. This results in a total dose rate estimate that does not require further manipulation. This is the approach used in the recent RESRAD runs performed by SAIC to verify previous unit concentration calculations.

5. According to the Department of Energy's A Manual for Implementing Residual Radioactive Material Guidelines (DOE/CE-9901, June 1989), RESRAD is used to derive guidelines for allowable concentrations of residual radioactive material in soil. It assumes a homogeneous contamination of large areas (several hundred square meters or more) with the distribution of radionuclides averaged over any 100-m² area and depth of 0.15-m-thick layer. As described in the RI/FS report, radioactive contamination at BOMARC is non-uniformly distributed over the site in "hot spots", at various depths, and activity levels, and involves structural components of the missile shelter, manholes, soil in the shelter area, asphalt, concrete, and materials and sediments in the primary drainage ditch. While the above referenced manual provides additional guidelines and criteria for dealing with non-homogeneous contamination (see Section 3.3), it does not appear from this assessment that this guidance was applied. Thus, the RESRAD runs for this assessment may not model the site adequately and, as stated on page 51 of the DOE manual, "the presence of hot spots could potentially pose a greater risk of exposure to individuals using the site than the risk associated with homogeneous contamination."

6. The approach used for the analyses reported in the RI/FS does not follow the guidance suggested by EPA for risk assessment under its own CERCLA remedial program. Chapter 10, "Radiation Risk Assessment Guidance", of EPA's Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part A - Baseline Risk Assessment) (EPA/600/1-89/002 (December 1989)), recommends a two-phase evaluation: (1) estimation of the dose equivalent rate to individuals using ICRP and EPA (Federal Guidance Report No. 11) methodologies to compare dose rate results with

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radiation protection standards and criteria; and (2) estimation of the health risk to individuals based on the age averaged lifetime excess cancer incidence per unit intake or exposure to compare risk results with EPA's remedial risk range, e.g. 10⁻⁶ to 10⁻⁵ lifetime excess total cancer risk. Exposure parameters (duration, frequency, and intake values) should be consistent with those provided in Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual Supplemental Guidance: "Standard Default Exposure Factors" (Interim Final) OMSR Directive 9285.6-03 (March 25, 1991).

7. As noted in our review of previous radiological data (e.g., November 6, 1991 letter), it is not clear as to why the soil ingestion exposure pathway has not been included in the farm family exposure scenario for RESRAD modeling. Also, it is not apparent why, in the baseline RESRAD runs, the calculated dose rate is zero at years 50 and 100. Statements made in the RI/FS and IIS suggest that Pu-239 and Am-241 have not migrated to a large extent in soil since their deposition 31 years ago, and the migration rate would not be anticipated to change significantly.

Table 5.2

Threshold Limits for Radioactive Surface Contamination;
Nuclear Regulatory Commission Guide 1.86

- Limits do not account for the depth or volume of contaminated material.
- Limits do not equate to dose or risk levels.
- Procedures and detection limits of instruments may not be sensitive enough to meet the release limits.
- NRC is currently replacing Reg. Guide 1.86 with new residual radioactivity guidelines to account for these deficiencies.

As in our November 6 comments, we recommend that the USAF consult with the NRC on its plans to develop residual activity criteria to replace the surface contamination limits in Regulatory Guide 1.86.

Section 5.1.1.1

As discussed in our comments on Sections 4.1.5.1 and 4.1.5.3, the SSSL should not be used as a risk-based remediation goal.

Table 5-3

The estimated volumes in this table do not account for materials currently stored on-site from past investigations. The manner in which these materials are to be addressed should be identified.

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Section 5.1.1.2

Contamination at BOMARC has been demonstrated to exist in discrete "hot spots". Therefore, it is not valid to eliminate sampling below 18 inches at such "hot spots" on the basis that a boring was immediately adjacent to the area in question (i.e., approximately 20 ft away) did not reveal contamination below two feet.

The missing front doors and sheet metal portion of the roof from Shelter 204 may be significant sources of contamination. This section is unclear as to whether these items are missing in the same manner as the missile launcher, or are simply not physically present, but are accounted for. If these items are in a known location, it should be stated in the document, including level of contamination and the remediation options. If the location of the items is unknown, then efforts should be made to locate them.

Section 5.1.1.3.1

Surface Contamination Standards: see comments on the use of the Nuclear Regulatory Commission's Guide 1.86 as stated in Section 5.0 - Table 5.2.

Section 5.1.2.2

A site visit conducted by Region II personnel revealed that contaminated areas are not consistently posted and, based on trash and graffiti in the area of the site, that unauthorized access to the site has occurred. Also, existing fences are rusted and in a state of disrepair. Lastly, regular patrols of this area by Military Police have been discontinued because of budget cutbacks. Thus, it appears that existing conditions are not those as stated in this section.

Section 5.1.2.3

See comments in section 5.1.2.2. Additionally, Regional personnel did not see signs posted every 50 feet as stated in this section.

Section 5.1.3.3

Information has not been provided documenting that Pu-239 and Am-241 behave similarly in the TRU-Clean process. As stated in our October 30, 1991 comments on the IIS, all results of the test soils have been evaluated in terms of Am-241 activity. The resultant Pu-239 activity needs to be analytically verified if the TRU-Clean process is to be used.

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Section 5.1.5.5

To prevent a release of respirable material in the event of an intruder scenario during "off hours", the proposed building would need to be maintained at constant negative pressure.

Section 5.2.3.3

To clarify the statement that "the quantity of Pu unaccounted for by site characterization efforts is sufficient that it would pose high risks. . .", the risk should be quantified.

As described in our comments on Sections 5.1.2.2 and 5.1.3.2, the statement that "maintenance of the physical barriers. . . is easily accomplished" appears to be inconsistent with the existing site conditions.

Section 5.2.3.5

TRU-Clean has not been quantitatively "proven effective" for Pu; see comments in Section 5.1.3.5.

Section 5.3.3

Evaluation of cost for a thirty year time period is insufficient given the 24,000 year half-life of Pu-239. Control of this site under this alternative is perpetual; thus, associated costs will be higher than stated here.

Section 5.3.5

Detail should be provided as to how engineering controls will address the potential chemical contaminants that may be at this site.

Appendix B - Section 1.3.4.2

The RI/FS mentions that a temporary enclosure for Shelter 204 will be erected to prevent the release of contaminated materials into the environment during removal of loose debris and borehole field investigations. At the time of a site visit by EPA staff, it was evident that no such enclosure had yet been erected. Future reports should state when this enclosure will be built.

Appendix D: Raw Field Data

Future reports should include maps to illustrate the locations for the air sampling, well purging, and surface water samples. The one map provided only shows the boring and coring points.

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Environmental Resources

The RI/FS refers to the presence of two species on the federal list of endangered and threatened species (bald eagle and peregrine falcon) in the Pinelands. However, it is not clear whether a consultation with the U.S. Fish and Wildlife Service has been performed or whether the potential impacts to these and other threatened and endangered species have been studied. The characterization of endangered or threatened species at the BOMARC site should be performed consistent with Section 7 of the Endangered Species Act of 1973. This should include informal consultation with the Fish and Wildlife Service. To request a determination of the presence of endangered or threatened species, or critical habitats, contact Mr. Clifford G. Day, Field Supervisor, U.S. Fish and Wildlife Service, 937 No. Main St., Glad. B. Pleasantville, New Jersey 08022. (Include a map of the affected area when making the request.)

The ARARs cited include the National Historic Preservation Act (NHPA). However, the RI/FS states that it is unknown whether the BOMARC area has been specifically studied. A determination of the presence of, and potential impacts on, cultural resources, in compliance with the NHPA, is a necessary component of the RI/FS process. At this point in the CERCLA process, such a study should include a determination of the presence or absence of historic or prehistoric resources in each of the study areas where earth-disturbing activities would occur. This process is referred to as a Stage I Survey. Historical information may be included in studies performed for McGuire Air Force Base or Fort Dix, or information can be obtained from the New Jersey State Historic Preservation Office. These and other sources should be used to assist the archaeologists carrying out the survey in determining the nature and extent of any necessary subsurface testing. Additionally, a copy of the survey should be forwarded to the EPA.

A determination should be made of the presence or absence of, and direct or indirect impact on, significant agricultural lands, pursuant to the Farmland Protection Policy Act of 1981 (7 USC 4201 et seq.) and the Farmland Protection Policy (7 CFR 658). The Soil Conservation Service and the local Soil Conservation District should be contacted.

Other

Columns 39, 40, and 41 on the "In-Situ Survey Sampling Stations (Plate 4-1)" are incorrectly numbered.

Although the geophysical surveys indicate potential areas where the launcher could be buried, there is no concrete information at

this time as to where it actually is. We recommend that the task of locating this potentially highly-contaminated piece of material be included as a required task, independent of the remedial alternative chosen, rather than its current inclusion as an option under various remedial alternatives.

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Director

Colonel Marlene K. Strume, USAF
Director, Environmental Management
BCI/Logistics and Engineering
Department of the Air Force
HQ MAC/LEW
Scott Air Force Base, IL 62275-5001

11 DEC 1991

Dear Colonel Strume:

Re: BOMARC Missile Site
Burlington County, New Jersey

The New Jersey Department of Environmental Protection and Energy (Department) has reviewed the Remedial Investigation/Feasibility Study for the BOMARC Missile Site, dated September 1991, prepared by Earth Technology Corporation, and has the following comments:

General Comments

1. It is understood that the chemical analyses data will be used in this report only to assess potential impacts on the remedial treatments due to their presence, and that the remediation of the chemical contaminants found (to include organic solvents) will be addressed under the Installation Restoration Program RI/FS for McGuire Air Force Base. Consequently, the comments in this letter on chemical contaminants, other than Pu 239 and Am 241, will be restricted to this framework.
2. It was indicated at an October 3, 1991 public meeting on the draft EIS that the Record of Decision will be prepared following the filing of the final EIS in February 1992. The RI/FS was not mentioned as a component in the process. It is appropriate that the finalization of the RI/FS should be linked to the timing of the EIS preparation as the RI/FS contains the data upon which the selection of the preferred remedial alternative will be based. Accordingly, this is indicated on page E5-14, however, the discrepancy with the public meeting information must be resolved.
3. The RI/FS is hard to follow because of missing figures/plates/appendices, no explanation of the mathematical manipulation of data, no follow through on calculations, the presentation of similar data in separate sections, and basic

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conclusions buried in Appendices. The material should be arranged so that it can be reviewed logically without the need to acquire reference documents.

4. There are some fundamental problems with the derivation of the Site Specific Soil Screening Level (SSSSL) of 3.0 uCi/m², which will be discussed in a subsequent letter regarding the Baseline Radiological Hazard Assessment.

Specific Comments**Executive Summary**

5. Page E5-9: The rationale behind the use of the HWEI to obtain an upper bound estimate of risk is acknowledged; however, the use of the Reasonable Maximum Exposure (RME) may have been more appropriate according to EPA risk assessment guidance (Risk Assessment Guidance for Superfund, December 1989). Additionally, if one utilizes an upper bound to evaluate a situation, it may be beneficial to also examine a lower bound estimate so that the full range of options available may be examined. It is recommended that this be done using the RME in conjunction with the HWEI.

Section 3 - Field Investigation Program

6. The culver under Route 539 should be sampled to determine if there is any contamination, unless this work has already been performed.
7. What is the explanation of the anomalous ground water data in the northeast section of the site? Historical data indicates soil contamination, while recent data does not show contamination. This suggests that historical data should be included in the evaluation of the contamination.
8. While it was determined that the nuclide causing the gross alpha to be elevated in well PU-7 is not plutonium, it must be investigated further.
9. The FIDLER survey instrument's estimated sensitivity is 0.5 uCi/m². However in Table 4-22, the activity reported using the FIDLER instrument is lower than 0.5 uCi/m². Clarification is needed.
10. Page 3-49: Indicate whether or not the filter paper was wetted prior to wiping the test surface and if so, with what.
11. Page 3-84: The method used to sort the soil sample should be identified.
12. Page 3-86: Explain the apparent discrepancy between the number of holes drilled on this page versus page 3-18 and page 4-88.
13. Page 3-95: The Department does not recommend the use of benzene in its decontamination procedure for inorganics; but since pesticide grade benzene was used, no deleterious effects are expected.

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Section 4 - Results and Significance of Findings

14. Page 4-4: It is stated "The wells sampled included PU-1 through PU-7 and MU-47 through MU-49." A total of 22 samples (both filtered and unfiltered) "were shipped to the laboratory to be analyzed for gross alpha and gross beta. Samples from three of the wells (with a fourth sample as a duplicate from well PU-3) were also analyzed for Pu-239 by alpha spectroscopy." Table 4-2 indicates that groundwater samples from five wells (PU-3, PU-6, PU-7, MU-48 and MU-49) were analyzed for Pu-239. A duplicate sample from PU-7 (denoted as PU-10) was also analyzed for Pu-239. This discrepancy must be clarified.

15. Page 4-6, Table 4-2: Explain the discrepancy in the number of wells sampled for Pu-239 in the table (5 wells) versus the text on page 4-4, paragraph 4 (4 wells).

16. Page 4-9, Paragraph 1: Explain the discrepancy between Table 4-2 and the text. Table 4-2 indicates there are 8 samples where gross alpha activity exceeded 15 pCi/l and if the positive error factor is included, there are 12. The text indicated 9 samples exceeded 15 pCi/l and 4 of these exceeded the level only if their positive error factor was included.

17. Page 4-9: It is stated that "A total of nine of the samples collected contained gross alpha in concentrations exceeding State and Federal Action Levels, only one of which was a filtered sample. Four of these samples, including the one filtered sample, exceeded the action level only if the positive error factor (ranging from +/- 7 pCi/l to +/- 7 pCi/l) was added to the reported activity." Review of Table 4-2 indicates that a total of twelve (12) groundwater samples from eight of the ten wells sampled (including both duplicate samples) exceeded the action level for gross alpha (15 pCi/L) if the positive error factor is included.

18. Page 4-14: It is stated that "the environmental investigation (Weston, 1989), performed in 1987, detected Pu-239 (0.9 +/- 0.3 pCi/L) in the first unfiltered ground water samples collected from well PU-4 after the well was installed. It was thought that the well may have been contaminated when it was constructed."

Although the presence of Pu-239 in PU-4 may be attributable to contamination during construction, plutonium was also detected in unfiltered groundwater samples from other wells at the site including PU-2, PU-3 and PU-7 (see page 3-53 of the EIS). These wells may also have been contaminated during construction, but this has not been confirmed.

19. Page 4-14: A general increase in gross alpha and gross beta activity was found toward the northeast at the site. It is stated that "Because none of the samples from the wells showed measurable plutonium, it would appear that the gross alpha and beta activities are not due to plutonium contamination." Due to a local groundwater divide in the vicinity of monitor well PU-4, and the fact that the pH at the site averages 4.72, it

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is hypothesized that "low activity rainwater infiltrates the ground surface near well PU-4; as it migrates through the ground, it leaches those naturally occurring alpha emitters such as uranium and thorium."

Although this is a reasonable hypothesis, information must be provided to support it since infiltration of the low pH rainwater may also increase the solubility of plutonium. The required information may include published data on groundwater analyses for gross alpha and beta from wells in other areas of the Pinelands and/or sampling and analysis of groundwater from wells in both recharge and discharge areas of the Pinelands. Existing wells located at McGuire AFB (but preferably not the BOMARC site) may be used for this purpose.

20. Page 4-15: It is stated that several volatile organic compounds (VOCs) were detected in monitor wells at the site. Some of these VOCs are attributed to laboratory contamination since they were also detected in QA/QC blanks. Trichloroethene and 1,2-dichloroethene are shown to be present in ground water at the BOMARC Missile Site. The levels of these contaminants range from 8 ug/l to 81 ug/l."

The magnitude and extent of the VOC contamination in groundwater at the site is currently being investigated under the ITP RI/FS for McGuire AFB. Because of the potential health risks associated with future use of the groundwater at the site (if it is not remediated), the proposed remedial alternatives must include institutional controls (i.e., deed restrictions) at the site (see General Comments above).

21. Page 4-15, Paragraph 1: An incorrect statement is made that the 15 pCi/l standard for gross alpha was not exceeded.

22. Page 4-15: It is stated that "All gross alpha and gross beta levels found were below the State and Federal Action Levels for drinking water, so no radiological hazard exists, even if these wells were used as a potable water source, which they are not."

As stated above, 12 samples from 8 wells were found to exceed the State and Federal action levels for gross alpha (15 pCi/L). This level is the same as the Federal Maximum Contaminant Level (MCL) listed in the National Interim Primary Drinking Water Standards (NPDWS). The MCL for gross alpha excludes radon and uranium. Since the amount of alpha activity attributable to naturally occurring radon and uranium (or to anthropogenic plutonium) is now known, these levels are a concern and therefore must be considered in the proposed remedial alternatives (see General Comments above).

23. Page 4-37: Were the NEDS02.0 results scaled? Whenever results are scaled, this should be shown clearly in the RI/FS. This is a problem throughout the document and Appendixes. Conclusions reported in Appendix H should be included in this section as well to make reading/reviewing easier.

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24. Page 4-30, Paragraph 4: The figure citation "3-14" is incorrect. Possibly the reference is to Figure 3-17 or Figure 4-14.

25. Page 4-72, Paragraph 3: Results of the hyperspore germanium detector survey of soils at the site indicate that "Outside the BOMARC property fence, the highest activity was detected in the ponding area to the west of Highway 539 (Fort Dix property)." The impact of groundwater due to plutonium or its decay products is uncertain but assumed to be non-existent. No information is available regarding the impact to groundwater due to the discharge of VOCs and rocket fuel in this area.

26. A shallow monitor well must be installed downgradient of the ponding area. This well must be sampled for Target Compound List (TCL) VOCs, TCL semi-volatile organic compounds (SVOCs), Target Analyte List (TAL) inorganics, total dissolved solids (TDS), gross alpha, gross beta and Pu-239 using alpha spectroscopy. Both filtered and unfiltered samples must be collected for the inorganic analyses. (The installation and sampling of this monitor well may be included in the ongoing RI/FS for McGuire AFB rather than the BOMARC site RI/FS).

27. Page 4-84, Figure 4-13: The contours indicate a different distribution pattern than would be expected considering the prevailing wind direction at the time of the incident. Further explanation is desirable to clarify why a pattern such as depicted in Figure 4-32 was not observed.

28. Page 4-88, Paragraph 3: The contention that the warhead site was smaller than 12 kg should be substantiated further and if possible a most probable size indicated. It would seem that if the amount of weapons grade plutonium lost can be estimated (p. 1-13), a better projection of the amount originally along Route 70 can be attributed to variation in site background or Pu-239 dispersion is seemingly dependent on this fact according to the rationale presented. A scenario like this one should not be made public without a more complete explanation, particularly if there is to be no follow-up investigation. Testing to alleviate public concerns could include upgradient FIDLER testing along roadways or alpha spectroscopy of the Route 70 sites.

29. Page 4-128, Paragraph 3: The figure citation "3-13 and 3-14" is incorrect.

30. Page 4-131, Paragraph 2: While the "assigned value" may be less reliable than actual laboratory data, the fact that the value exceeds the U.S. background level by a factor of 33 is also significant. The correlation work in Appendix I was presented to support the use of the "assigned values" in place of the lost samples. It is inappropriate to discount the validity of this datum if similar type data are to be utilized elsewhere.

31. Page 4-157: Were the GENII results scaled? Scaling results should be clearly shown in calculations. Also see comments under Appendix J. Are the values in Table 4-40 scaled? It appears that they are, but there is no explanation or examples showing this scaling factor.

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02.02.02.01#213
02.02.02.03

Section 5 - Alternative Remedial Measures

32. Page 5-5: What is the explanation for using a depth of 1 cm to convert 3.0 uCi/m² to pCi/g when throughout the RI/FS the Air Force uses 5.1 cm? Substituting 5.1 for 1 cm results in a cleanup level of 36.8 pCi/g vs. 187.5 pCi/g as calculated by the Air Force. Obviously using 1 cm is not "conservative" as indicated. Also, the Department questions the use of 5.1 cm for depth of contamination based on the Air Force's statement "The depth of plutonium contamination greater than the risk based cleanup level for 3.0 uCi/m² was generally less than one foot across the site."

33. In one area of the asphalt-covered drainage ditch off the concrete apron, the vertical extent of Pu contamination was not determined, but extended to a depth of at least 18 inches. Using the results of a soil boring twenty feet from this location cannot be used to justify the absence of contamination below two feet in this location.

34. Page 5-18: Although we do not consider these contaminants to be Low Level Radioactive Waste (LLRW), the New Jersey Low Level Radioactive Waste Disposal Facility Siting Act prohibits the construction of a LLRW disposal site in the Pinelands, and thereby could be construed as a State policy regarding the disposal of other radioactive waste in the Pinelands. Therefore, on-site disposal should not be considered as an option.

35. Alternative 6, offsite disposal, as well as alternative 5, must include institutional controls such as deed restrictions to prevent the use of groundwater should the facility be sold.

36. Remedial action goals are listed. The proposed remedial alternatives do not comply with all of these goals since they do not address contaminated groundwater at the site.

37. Page 5-39, Paragraph 5: The results of any treatability studies using site specific soils should be presented (such an effort was indicated to have occurred on page 4-101 and 5-59). Information such as that presented on page 5-47, paragraph 4, is required at a minimum. Subsequently, a projection of the level of contamination that will remain in the soil that is to be redeposited on-site should also be made.

38. Page 5-44, Paragraph 1: Because only wastes less than 100 uCi/kg are being accepted by the disposal facilities, it may be prudent in the off-site disposal alternative to develop contingency planning for decontaminating the missile launcher or other large items which may be heavily contaminated and require disposal.

39. There is much uncertainty associated with the modeling, specifically the weather conditions, height of release, and material available for release. There also is great uncertainty in the validity of the FIDLER readings (measurement and calibration procedures, definition of the lower limit of detection, etc.) as reported on page 8. How then could one of the Air Force's conclusions be: "The fact that well defined patterns

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02.02.02.01#215
02.02.02.01#216
04.05.01
03.04#217
03.04/03.05
05.02#218
02.02.02.06#219
03.04#220
03.05#221
02.02.02.03

were predicted by HESDI 2.0, and none were found, argues that no measurable ground contamination occurred from the Pu plume released during the fire. This source should be eliminated from the test, since no emissions could be reached from this source.

Appendix J

40. This entire Appendix lacked sufficient information to perform a comprehensive review. In future revisions, please explain all derived dose rates and show calculations.

41. The use of default vs. site specific values as inputs to HESRAD should be explained.

42. The GWTI source term input (74 uCi/yr) is not consistent with the calculation in Appendix 8 of the EIS (915 uCi/yr). This discrepancy should be corrected or explained.

Please be advised that comments on the Baseline Radiological Hazard Assessment will be sent in the near future. If you have any questions, please contact me at (609) 633-1455.

Sincerely,

Guen Berunas

Guen Berunas, Case Manager
Bureau of Federal Case Management

b3

cc: Jeff Story, BOWPA
Terry Sugihara, DEEDA
Robert Pambianco, McGuire Air Force Base
Ken Kuehler, Office of Program Coordination

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02.02.02.03

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APPENDIX 2-3

COMMENT SUMMARIES AND RESPONSES

PUBLIC COMMENT RESPONSE FORMAT: A GUIDE TO LOCATING COMMENTS AND RESPONSES

This Appendix presents summaries of the public comments (and responses) to the BOMARC Missile Site - McGuire Air Force Base (AFB) Draft Environmental Impact Statement (DEIS). These comments were received by the United States Air Force during the DEIS public comment period.

Comments have been categorized and assigned a category code according to environmental issues. The categorization plan is provided on Pages 3-2 and 3-3.

Comment summaries contain document identification numbers. Each document presented in Appendices 2-1 and 2-2 has been assigned a unique identification number. These numbers provide a correlation between comments and responses in this Appendix to the original commentor source documents presented in Appendices 2-1 and 2-2.

These comment document identification numbers are composed of three parts: a two-letter prefix, a unique five-digit identification number, and a page number enclosed in parentheses. There are two two-letter prefixes. The prefix OR indicates oral testimony presented at the public hearing held on October 3, 1991 in Cookstown, New Jersey. The WR indicates written comments received during the public comment period at times other than the public hearing. A unique five-digit identification number ranging from 00001 to 00025 has been assigned to each public comment document submitted. The concluding number enclosed in parentheses signifies the page number of the document.

Example: WR-00025(2)

The document identification number WR-00025(2) designates a document submitted as a written comment, a document number of 00025, and a reference to Page 2 of the document.

Appendices 2-4 and 2-5 provide indices of comments and commentors.

CATEGORIZATION PLAN

| Category | Title |
|-------------|--|
| 01 | EIS Correspondence/Communications |
| 02 | Purpose and Need for Action |
| 02.01 | BOMARC Missile Site Accident History/Disposition of Accident Materials |
| 02.02 | Issues Relating to the RI/FS |
| 02.02.01 | Coordination of the RI/FS and EIS |
| 02.02.02 | Remedial Investigation/Risk Assessment |
| 02.02.02.01 | Nature and Extent of Contamination |
| 02.02.02.02 | Fate and Transport of Contaminants |
| 02.02.02.03 | Methodology/Assumptions/Calculations |
| 02.02.02.04 | Exposure Scenarios/Pathways |
| 02.02.02.05 | Uncertainty/Sensitivity Analyses |
| 02.02.02.06 | Cleanup Standards/Risk Levels/ARARs |
| 02.02.02.07 | Presentation and Completeness of Data/Organization |
| 02.03 | Relevant Federal, State and Local Statutes, Regulations and Guidelines |
| 03 | Alternatives Considered for Action |
| 03.01 | Unrestricted Access |
| 03.02 | NEPA No Action |
| 03.03 | Limited Action |
| 03.04 | On-site Treatment |
| 03.05 | Off-site Disposal (Preferred Alternative) |
| 04 | Affected Environment and Impacts |
| 04.01 | Geology and Soils |
| 04.02 | Hydrology/Groundwater |
| 04.03 | Meteorology and Air Quality |
| 04.04 | Biology |
| 04.04.01 | Ecological Inventory |
| 04.04.02 | Biological Transmission of Plutonium |
| 04.04.03 | Threatened and Endangered Species |

CATEGORIZATION PLAN

(Continued)

| Category | Title |
|-----------------|---|
| 04.05 | Land Use |
| 04.05.01 | New Jersey Pinelands Management Plan |
| 04.05.02 | Farmlands Preservation |
| 04.05.03 | Wetlands |
| 04.06 | Cultural Resources |
| 04.07 | Public and Occupational Health |
| 05 | Mitigation Measures |
| 05.01 | Monitoring/Sampling |
| 05.02 | Restricted Access/Institutional/Controls |
| 05.03 | Dust/Sedimentation Control |
| 05.04 | Restoration/Revegetation |
| 05.05 | Health Studies/Monitoring |
| 06 | Request for Additional Information/Notification |

01 EIS CORRESPONDENCE/COMMUNICATIONS

#29

COMMENT: Please ensure that we are included on your mailing list to receive a copy of the Final Environmental Impact Statement (FEIS), and future EIS's which may indicate potential public health impact and are developed under NEPA. [WR-00010(1)].

RESPONSE: The Air Force will provide the commentor with the FEIS and relevant EIS's developed by the Air Force for the site.

#58

COMMENT: Notification of the selection of the preferred alternative was requested so that specific permit application requirements could be identified. [WR-00017(2)].

RESPONSE: The Air Force's Preferred Alternative is off-site disposal. The Air Force will comply with all applicable permit requirements. The commentor's office would be contacted to obtain specific application requirements associated with the preferred alternative no matter which alternative was selected.

#82,97

COMMENT: Important documents essential to the review of the EIS were not sent in a timely manner. [WR-00021(1), WR-00022(2)].

RESPONSE: Prior to the opening of the public comment period the EIS and accompanying documents were sent to three public libraries, located in the Ocean County communities of Toms River, Lakehurst and New Egypt. Additional copies were also forwarded to the commentors at their request.

#95

COMMENT: There has been procedural confusion in our Department regarding the submission of comments and lead agency coordination. Until this manner is resolved, please address all correspondence to the Director's attention. [WR-00021(4)].

RESPONSE: Noted.

#35,46

COMMENT: Extension of review and comment period requested. [WR-00013(1), WR-00014(6)].

RESPONSE: An extension of the comment period was granted.

#128

COMMENT: The U.S. Environmental Protection Agency requested a meeting with the Air Force on January 9, 1992 to resolve outstanding issues. [WR-00024(1)].

RESPONSE: The meeting mentioned above was held on 9 January 1992 at the U.S. Environmental Protection Agency (EPA) Region II Edison, New Jersey facility. Representatives of the Air Force, EPA and the N. J. Department of Environmental Protection and Energy (NJDEPE) attended. The purpose of the meeting was to discuss the resolution of regulatory comments on the draft RI/FS and EIS documents, focusing on two major issues:

- Verification of the quantity of residual plutonium at the site, and
- Modifications to the baseline radiological assessment.

Issue 1: Residual Plutonium

Background: The Air Force summarized the history of the material removed from the site. Shortly after the 1960 missile accident, seven containers of plutonium were recovered by explosive ordnance disposal personnel. Initially the containers were sent to Medina Base, San Antonio, Texas. The containers remained at the Medina Base until approximately 1965 when they were transferred to the Department of Energy (DOE) Pantex facility. The containers remained at Pantex until 1979 or 1982. The DOE conducted measurements of the material sometime between 1979 and 1982. The Air Force indicated that even with a conservative error factor, the measurements of the upper limit of the plutonium that could have been left on-site is 200 to 300 grams.

The amount of plutonium in the warhead is classified. The Air Force explained that it would be difficult to arrange to provide access to classified information for someone from EPA with appropriate clearance in a short time period. It was agreed that since it was unlikely that appropriate clearances could be obtained, an unclassified account of the audit trail would be adequate documentation and would be included in the Environmental Impact Statement (EIS). This unclassified account is provided as Appendix 2-5 of this EIS.

Issue 2: Modifications to Radiological Assessments

Background: The Air Force identifies Off-site Disposal Alternative as the Preferred Alternative. The appropriate level of cleanup was the critical issue in determining if that alternative could be implemented. To clarify the cleanup level proposed in this alternative and to answer a number of questions presented by EPA and the NJDEPE, it was decided that the methodology utilized in the radiological assessments would be modified.

The following modifications have been used in the final RI/FS and EIS.

- **RESRAD Version 4.1 was utilized.**
- **Guidance on non-homogenous distribution of contamination were incorporated into the model runs, as appropriate.**
- **The exposure parameter values in EPA's OSWER Directive 9285.6-03 would be used.**
- **The RI/FS and EIS would state the reason for the resuspension rate that was used in the model runs.**
- **The sensitivity analysis in RESRAD, which varies a single parameter at a time, would be utilized.**
- **The clean up level would be based directly on the output from RESRAD. An effective dose equivalent of four millirem (mrem) per year was used as the input into RESRAD as the dose limit. This dose represents an acceptable lifetime cancer risk of less than 10^{-4} . The cleanup criterion are expressed in units of picocuries per gram (pCi/g).**

02 PURPOSE AND NEED FOR ACTION

#12,13,34,49,59,60

COMMENT: There is a need for immediate action to clean up the site and protect the environment and the health of neighboring communities. [WR-00004(1-2)], WR-00005(1), WR-00012(1), WR-00015(1), WR-00017(2), WR-00018(1)].

RESPONSE: The Remedial Investigation (RI) and the EIS have identified no immediate health threats to neighboring communities. After a careful screening and evaluation process, The Air Force has identified the Off-site Disposal Alternative as the Preferred Alternative since this option will remove any potential for risk to human health and the environment. Under this Preferred Alternative, all contaminated soils and materials will be removed from the site, eliminating any possible long-term exposure.

02.01 BOMARC MISSILE SITE ACCIDENT HISTORY/DISPOSITION OF ACCIDENT MATERIALS

#2

COMMENT: The missile launcher may be buried in an old landfill at the end of the runway area at McGuire AFB. [OR-00001(27-28)].

RESPONSE: A geophysical survey was conducted to identify anomalies which could potentially be the buried missile launcher. The survey focused on areas proximate to the missile launcher site which were considered likely disposal locations. The landfill at the end of the runway was not surveyed because it was not considered a likely location. In addition, a survey conducted in the landfill area would necessarily identify geophysical anomalies from all metallic materials buried in the landfill. It would not be possible to further delineate the nature of the metal debris without extensive excavation.

#11,14,23,51,100,149,155,210

COMMENT: The Air Force should account for contaminated materials and any residual plutonium on-site. [WR-00004(1), WR-00005(1), WR-00006(1), WR-00016(1), WR-00022(3), WR-00024(8,9), WR-00025(5)].

RESPONSE: The amount of the original weapon-grade (WGP) plutonium in the warhead is classified. An unclassified summary, prepared by DOE and Air Force scientists, that provides the audit trail of the material from the accident is provided as Appendix 2-5. The summary verifies in relative terms the amount of material removal from the BOMARC Missile Site. The summary indicates the upper limit of the amount of plutonium that could possibly remain on-site is 300 grams and indicates that it is unlikely that a significant amount of WGP is associated with the missing launcher. The Air Force would attempt to locate and remove the missile launcher under the Preferred Alternative (off-site disposal), the On-site Treatment Alternative, and the Limited Action Alternative.

Under the Preferred Alternative/Off-site Disposal and the On-site Treatment Alternative any contaminants would be removed.

#64,70

COMMENT: The Air Force should determine the potential health impacts from the contamination associated with the missing plutonium at the BOMARC Missile Site. The missing material should be accounted for. [WR-00020(1,4)].

RESPONSE: The amount of plutonium in the warhead remains classified. An unclassified summary of the disposition of the missing material, prepared by the Air Force and the DOE, provides the audit trail of the material and is included as Appendix 2-5. DOE and Air Force scientists have conservatively estimated the upper limit of WGP at the site to be 300 grams. Because of standard decontamination procedures utilized by the Air Force, it is unlikely that any significant mass of WGP is associated with the missing launcher.

A baseline risk assessment was conducted in order to quantify risks to human health and the environment. Risks were estimated for both offsite populations and for a hypothetically maximal exposed individual (HMEI) residing onsite. For this worst-case scenario, it is assumed that all unaccounted contamination is associated with the missing launcher; the HMEI is exposed upon inadvertently constructing a house at the missing launcher disposal site.

#144

COMMENT: Efforts should be undertaken to determine the location of the earthen dam. Also, it should be determined where the material from which it was constructed was deposited once fire fighting efforts ceased. [WR-00024(7)].

RESPONSE: These efforts were undertaken, and were inconclusive. This information has been added to the RI/FS report.

02.02 ISSUES RELATING TO THE RI/FS

02.02.01 COORDINATION OF THE EIS AND THE RI/FS

#47

COMMENT: The EIS should be a stand-alone document: this is not the case with the current document; the reader is referred to the RI/FS for essential information. Important information is mentioned in the RI/FS but not in the EIS. [WR-00014(5)].

RESPONSE: This EIS is intended to be analytic rather than encyclopedic. It relies on and directs the reader to the RI/FS for supporting documentation. The significant issues discussed in both documents are consistent.

#183

COMMENT: It was indicated at an October 3, 1991 public meeting on the draft EIS that the Record of Decision will be prepared following the filing of the FEIS in February 1992. The RI/FS was not mentioned as a component in the process. It is appropriate that the finalization of RI/FS should be linked to the timing of the ROD preparation as the RI/FS contains the data upon which the selection of the Preferred Alternative will be based. Accordingly, this is indicated on Page ES-14, however, the discrepancy with the public meeting information should be resolved. [WR-00025(1)].

RESPONSE: The FEIS and RI/FS documents will be issued simultaneously.

02.02.02 REMEDIAL INVESTIGATION/ RISK ASSESSMENT

02.02.02.01 NATURE AND EXTENT OF CONTAMINATION

#15

COMMENT: Identify the extent of contamination, considering air, soil, surface, and groundwater. [WR-00005(1)].

RESPONSE: This was done during the RI. The purpose of the Remedial Investigation is to identify the nature and extent of contamination at and surrounding the site.

#72,157

COMMENT: It is not clear why the results of the hazard assessments are based on the most recent in situ gamma radiation surveys done in 1989, when over 30 years of data have been collected from 20 or more surveys of the BOMARC Missile Site. In situ gamma radiation measurements made with FIDLER or hyper-pure germanium detectors (HPG) can be used to approximate the areal extent of gamma-emitting radionuclide contamination in soil, at least superficially, provided that (1) there is a large enough source of gamma activity, (2) the photons emitted by gamma-emitting nuclides are of sufficient energy and abundance, and (3) the source is not too deeply buried. These types of measurements cannot, however, be used in the absence of other data (such as borehole logging measurements) to estimate the depth, distribution, or activity concentrations of these radionuclides in soil or any other non-uniformly contaminated source, no matter how well the detectors are calibrated or how carefully the measurements are made. It appears that these types of measurements were used incorrectly in the baseline assessments to estimate the depth and mean (areal) concentrations for Pu-239 and Am-241. As a result, we are concerned that the dose and risk estimates for BOMARC Missile Site, which are directly dependent on the depth and concentration estimates, may also be incorrect. [WR-00020(4) and WP00024(10)].

RESPONSE: The in situ data originally were used because they were the most complete set of good data. Other data were not ignored, and were used where needed - for instance, for depth determination or for Pu-239 contamination. The hazard assessment has been revised, and is now based primarily on soil sampling data as well as the in situ survey.

#30,33,91,94,109,110,188,189

COMMENT: It is stated on Page 3-53 of the RI/FS that "The groundwater samples (collected by Weston) contained substantial amounts of suspended solids. It is not clear whether the plutonium detected at various times and in varying wells represents samples contaminated with the surface-contaminated soils, or if it reflects the actual presence of plutonium in the groundwater. It would be noted that because plutonium has low solubility and high sorption, it can be transported through groundwater with soil colloids. However, this type of transport is very erratic and difficult to predict. Relatively long-term pumping and sampling would be needed to actually detect its presence in a monitoring well. The report goes on to say that "The Ph ranges from 3.5 to 5.5 (Mean et al., 1981). This acidic nature may increase the solubility of plutonium". [WR-00011(1), WR-00011(2), WR-00021(3), WR-00022(4)].

It is stated that "As discussed in Section 3.3.3.3, groundwater sampling and analysis indicated that no radioactivity associated with plutonium could(not) be detected". This conclusion was not made in Section 3.3.3.3. There is a general lack of information regarding the presence of plutonium and its decay products in the groundwater site. Although no plutonium was detected in any wells during the latest round of groundwater sampling, it is still not known if its decay products (e.g., Alpha particles) are present in the groundwater at the site or if the elevated levels of gross alpha detected in some monitoring wells are due to the decay of naturally occurring radionuclides. [WR-00021(3)].

What is the explanation of the anomalous ground water data in the north east section of the site? Historical data indicates soil contamination, while recent data does not show contamination. This suggests that historical data should be included in the evaluation of the contamination. [WR-00025(2),

While it was determined that the nuclide causing the gross alpha to be elevated in well Pu-7 is not plutonium, it must be investigated further. [WR-00022(4),WR-00025(2)].

RESPONSE: The Air Force has conducted additional groundwater sampling. Results are included in the FEIS and RI/FS, and indicate that the nuclides causing elevated gross alpha activity are naturally-occurring uranium species, and small quantities of naturally-occurring radium-226.

#86,101,116,117,214

COMMENT: The depth of contamination used to convert 3.0 $\mu\text{Ci}/\text{m}$ to pCi/g is questionable. Two different depths are cited in the text. The text uses 5.1 cm throughout, except when calculating a cleanup criterion. [WR-00021(2), WR-00022(3), WR-00022(4), WR-00025(6)].

RESPONSE: The cleanup criterion is now expressed in units of pCi/g , so the unit conversion is necessary only to estimate areal concentration for resuspension. A single depth is used throughout the document.

#108

COMMENT: Was the culvert under Route 539 sampled to determine contamination? [WR-00022(4)].

RESPONSE: No. Due to health and safety complexities involved with confined space entry, the culvert was not sampled. However, this culvert would be sampled as part of the Preferred Alternative or any active restoration remedial alternative selected.

#111,190

COMMENT: The FIDLER survey instrument's estimated sensitivity is $0.5 \mu\text{Ci}/\text{m}^2$. However, in Table 4-22, the activity reported using the FIDLER instrument is lower than $0.5 \mu\text{Ci}/\text{m}^2$. [WR-00022(4), WR-00025(2)].

RESPONSE: This is clarified in the final RI/FS.

#118,215

COMMENT: In one area of the asphalt-covered drainage ditch off the concrete apron, the vertical extent of Pu contamination was not determined, but extended to a depth of at least 18 inches. Using the results of a soil boring twenty feet from this location cannot be used to justify the absence of contamination below two feet in this location. [WR-00022(5), WR-00025(6)].

RESPONSE: Comment noted. The results of the soil boring are not used as evidence of a lack of contamination below 18 inches. The total depth of contamination would be established by confirmatory sampling under the Preferred Alternative or any active restoration remedial alternative selected.

#132

COMMENT: It is asserted on Page 2-12 of the RI/FS that the groundwater flows across the site to the east and southeast. However, the groundwater flow direction implied by the groundwater elevations shown in Figure 4-2 and stated on Page 4-4 (in a northeast direction) appears to contradict this assertion. As the RI/FS states, groundwater flow information is inconclusive since there is insufficient data regarding flow directions in at least wells PU-2 and PU-4. Accordingly, further definition of flow direction is needed.

Similarly, there appears to be inadequate groundwater monitoring coverage in the southwest portion of the site near Highway 539 and southeast from the ponding area where runoff from the site collects. Construction of additional wells in these areas would aid in determining flow direction and help to delineate contaminant migration southwest of the groundwater divide. [WR-00024(4)].

RESPONSE: The discussion regarding direction of flow has been clarified in the text of the EIS.

Wells PU-2 and PU-4 are located very near the axis of a groundwater divide; consequently, it is difficult to determine whether groundwater flow at those points is to one side of the axis or the other, and in fact, flow direction may change with seasonal recharge fluctuations. However, for the purposes of defining the groundwater flow directions for the site (not for a particular point on the site) the number of wells currently present is considered sufficient.

The Air Force does not agree that there is currently a need for groundwater monitoring on the southwestern portion of the site. During a Technical Review Committee meeting held on April 13-14, 1989 and attended by EPA and NJDEPE, the Air Force solicited and received input on groundwater monitoring efforts. As a result of that meeting, it was agreed to sample ten monitoring wells in the vicinity of Missile Shelter 204, where the bulk of radioactive contaminants are found. This sampling has been accomplished.

A separate issue raised, which involves resampling of the ten wells to determine the specific radionuclides causing elevated gross alpha activity, is a valid issue, and the Air Force has conducted groundwater sampling to determine whether the elevated gross alpha activity is, in fact, caused by naturally-occurring radionuclides (see response to #30, 33, 91, 94, 109, 188, 189). No radionuclides attributable to the missile accident were detected in wells surrounding the most heavily contaminated area on-site (the Shelter 204 area), so we conclude that there is no need to investigate groundwater in the much less significant potential source area located on the southwestern portion of the site.

#133

COMMENT: It is stated that in the RI/FS that "the water supply wells on the BOMARC facility are not currently being used for any purposes." Information regarding the maintenance of these wells should be included in the RI/FS, or the wells should be abandoned according to appropriate standards (i.e., EPA's "Manual of Water Well Construction Practices" or other state or local regulations/guidance). Such action will prevent the wells from providing conduits for subsurface contamination.

Also on Page 2-14, information is provided on groundwater uses based on the 1969 reporting year. More recent data should be included, particularly for the Naval Air Engineering Center - Lakehurst.

Additionally, a thorough search should be conducted for the well that was reportedly used as a disposal well for the "various fluids", as this could contribute to any organic contamination detected in the groundwater. [WR-00024(4)].

RESPONSE: First Paragraph - This issue will be addressed as part of the separate ongoing investigation of chemical contamination at the site.

Second Paragraph - This information has been incorporated.

Third Paragraph - The effort described is the subject of an ongoing investigation of chemical contamination at the site.

#134,142

COMMENT: Geophysical surveys were conducted in only four areas, but no explanation was given for the choice of these four areas. We are particularly interested in clarifying whether the areas not surveyed have buried drums. Also, it is unclear whether the drums located by magnetic profiling are suspected of containing plutonium contaminated wastes. A determination should be made as to the type and level of contamination present (if any) and, if present, provide dose and risk estimates for this material. [WR-00024(5), WR-00024(7)].

RESPONSE: The four areas surveyed were selected based on a records search and available access for launcher burial at the time of the accident. This information has been added to the RI/FS report. Areas not surveyed are the subject of the above-referenced ongoing investigation. The geophysical survey located magnetic anomalies that could represent drums, but the survey did not locate, nor is it capable of identifying subsurface objects. The risk estimates requested were covered in the intruder scenario of the risk assessment contained in the EIS.

#135

COMMENT: Reference to Pages 3-80 to 3-81 (RI/FS); An explanation should be provided in this section as to why background soil samples were not analyzed for the complete set of analyses as were other samples. [WR-00024(5)].

RESPONSE: The reason for this is that all synthetic organic chemicals present on-site were assumed to be attributable to site activities; however, this was not the case for naturally-occurring metals. This information will be added. Again, chemical contamination at the site is the subject of a separate ongoing investigation.

#136

COMMENT: The report (RI/FS) indicates inconsistencies in determining the activity patterns of the site related contaminants due to either contaminant migration from the source area or due to a groundwater recharge area centered near monitoring well PU-4. The Earth Technology Corporation notes that well coverage in the northeastern portion of the site is insufficient to draw any conclusions as to the reason for lowered radioactivity near MW-48. EPA recommends additional wells to the northeast of MW-48 to further characterize the groundwater activity trend in this location. [WR-00024(5)].

RESPONSE: Since this RI/FS did not detect radionuclides in groundwater that are attributable to the site the concepts of "activity patterns of site-related contaminants," and "contaminant migration" in groundwater do not apply to this site. The suggestion that additional wells are required near MW-48 to determine the reason for a lack of activity in that well seems particularly inappropriate, because all available evidence indicates that the gross alpha and beta activities are associated with naturally-occurring radionuclides. If this is the case, the lowered activity patterns at MW-48 have no bearing on this investigation.

#137

COMMENT:

The hypothesis by Earth Technology suggests that suspended sediments have contributed to unusually high concentrations of total aluminum and iron, not typical of the Pinelands region. According to the RI/FS, the filtered samples taken were depicted as turbid due to inconsistent filtration efficiency. Therefore, the data representing metal concentrations in Table 4-5 and 4-6 are not representative of the site and are considered invalid. However, there was no mention that follow-up sampling would take place as a result. Follow-up filtered sampling is recommended to ensure that the actual metal concentrations are below regulatory limits. [WR-00024(5)].

RESPONSE: A sampling program is being undertaken as part of an ongoing investigation of chemical contamination at the site. The regulatory limits referred to are secondary standards, not primary drinking water standards.

#138

COMMENT: The 26 soil borings terminated at depths of 10 feet or less even though the water table is 20 to 50 feet below the surface at the site. Also, the results in Table 4-24 indicate that soil from 7 of the boreholes exhibited counts per minute (cpm) values at the bottom of the borehole that were equal to or greater than the cpm values at shallower depths. For this reason, we recommend soil analysis down to the water table to more accurately determine the potential for migration. Also, it should be stated whether the values cited (ca. 100-200 cpm) are considered to be background levels. [WR-00024(5)].

RESPONSE: This comment takes into consideration only field screening (FIDLER) data. We believe that a much more reliable indication of plutonium distribution with depth is derived from review of the laboratory analytical data (plutonium analysis by alpha spectroscopy) also contained in Table 4-24. The analytical data indicate that in all cases at the bottom of the borehole plutonium activity is less than 1 pCi/g, and furthermore, in almost all but one case, there is a decrease of one or more orders of magnitude in plutonium activity from the surface to the bottom of the borehole. We believe it is inadvisable to drill through contaminated areas to the water table, given the fact that this investigation has established that vertical distribution of plutonium is in almost all areas of the site limited to the upper few feet of the soil column. Borehole installation could introduce radioactive contaminants to groundwater. A more reliable indication of the potential for contaminant migration in groundwater is groundwater sampling data.

#139

COMMENT: Reference to Section 4.1.5.2.1 (RI/FS); This section indicates the unlikelihood that the drainage ditch north of Shelter 204 has contributed to off-site contamination. The point of intermittent high radioactivity near the northeastern boundary of the facilities may imply that this assumption is incorrect. Additional surface water and surface soil samples northeast of monitoring wells MW-48 are recommended to confirm that plutonium is not migrating northeast via surface water runoff. [WR-00024(6)].

RESPONSE: Existing data generated by the in-situ survey indicate a lack of contamination in the drainage ditch area. The point of intermittent activity is unrelated to the drainage ditch because the drainage ditch does not drain this area or flow nearby. This point was sampled during the investigation with essentially background levels of plutonium detected.

#140

COMMENT: As stated in the RI/FS, it has yet to be determined if any natural or man-made surface drainages, underground drainage conduits or tunnels which could influence surface recharge and underground flow direction exists. EPA recommends that such an investigation be conducted.

Planning for the treatment and disposal of plutonium-bearing soil should take into account recent work on facilitated transport of contaminants attached to colloids. For example, trace amounts of plutonium and americium were found attached to colloids almost two miles from a Los Alamos National Laboratory site where the radionuclides had been treated and disposed. (See W.R. Penrose et al, Environmental Science Technology 24, Vol. 228, 1990, and the July 1991 "Environmental Research Brief - Facilitated Transport of Inorganic Contaminants in Ground Water, Part II: Colloidal Transport" (EPA/600/M-91/040). [WR-00024(6)]).

RESPONSE: First Paragraph - The direction of groundwater flow at the site is adequately defined regardless of small-scale localized perturbations caused by man-made objects. These objects may cause localized increases in infiltration and recharge, but are not expected to alter or otherwise significantly influence groundwater flow directions at the site.

Second Paragraph - It is unclear how colloidal transport of contaminants in groundwater will affect soil treatment or disposal.

#141

COMMENT: RCRA regulated constituents were tested for in the soil groundwater at the site. The levels appear to be below the federal and state action levels as specified in draft RCRA corrective action regulations and guidance. The relation of these sampling results should be clearly indicated in the Executive Summary and other appropriate sections of the report.

Future analytical work at the site should include retesting for RCRA and TSCA regulated constituents, including Toxicity Characteristics Leaching Procedure (TCLP), to confirm their presence or absence. [WR-00024(6)].

RESPONSE: First Paragraph - This information has been added to the EIS.

Second Paragraph - The proposed sampling would be necessary prior to disposal of soils. Appropriate analytical work will be performed prior to any shipment of wastes off-site.

#145

COMMENT: It is stated on Page 3-20 (RI/FS) that, "Background was established several times

daily by taking readings in uncontaminated areas." The location at which these readings were taken should be specified. [WR-00024(7)].

RESPONSE: This information was added to the final RI/FS and EIS.

#146

COMMENT: Reference to Section 3.6.1 (RI/FS); There is a scarcity of sampling data for the two culverts on the BOMARC Missile Site. The extent of contamination should be determined, in addition to effects that this may have on the amount of material requiring remediation. [WR-00024(7)].

RESPONSE: The effects on waste volume will be small, if any. Sampling of culverts and surrounding soils will be undertaken as part of the remedial action.

#147

COMMENT: Reference to Section 3.6.2.5.3; Samples (corings) should be obtained to determine the extent of contamination in the base of the bunker. [WR-00024(7)].

RESPONSE: Due to significant health and safety concerns involved with placement of sampling personnel inside a small underground radioactive enclosed space, the Air Force has not cored and does not plan to core the base of the underground bunkers. Bunkers will be removed under active restoration alternatives, with any underlying soils contaminated above action levels removed also. These actions will be documented in remedial design documents for any active restoration remedial alternative selected.

#149

COMMENT: Reference to Section 4.1.3.6.2 (RI/FS); Elimination of four positive values near the accident site, because little aerial deposition was expected in this particular area, may not be a valid determination. Instead, these values should only be eliminated based on the results of appropriate sampling and analytic techniques. [WR-00024(7)].

RESPONSE: Text in Section 4.1.3.6.2 has been modified to explain the rationale for elimination of data points.

#150

COMMENT: Reference to Section 4.1.3.8.3 (RI/FS); The vertical extent of contamination at Station 001-SL-IS3, which is a "high activity zone", should be determined. Samples collected at this station have exceed 100,000 pCi/gm. [WR-00024(8)].

RESPONSE: The activity levels of over 100,000 pCi/g were found in the <20 micron particle size fraction of the sample; this fraction represents a few percent of the bulk soil sample, and these few percent are in the particle size range that has the greatest affinity for plutonium. In other words, radioactivity has been artificially concentrated in this sample fraction. As shown in Table 4-30, the corresponding sample fraction of >20

micron particles had an activity of 58 pCi/g. The >20 micron fraction comprises at least 90% of the sample. As for defining the extent of vertical contamination at any particular point on-site, we believe that this is unnecessary. Any active restoration remedial alternative will include confirmatory sampling to ensure that the full vertical extent of contamination is remediated to the appropriate cleanup level.

#152

COMMENT: Reference to Figure 4-38 (RI/FS); Very little sampling has been done in the bunker area (#306) although this area consistently shows activity levels in excess of EPA's soil screening level ($0.2 \mu\text{Ci}/\text{m}^2$). Further sampling may be required at this location. [WR-00024(8)].

RESPONSE: This area was sufficiently investigated using the HPG; levels of radiation do not approach the cleanup criterion for soil. Therefore, additional sampling is not required.

#154

COMMENT: The point of intermittent high activity" identified near the northeastern boundary of the facility should be analyzed. [WR-00024(9)].

RESPONSE: This area was sampled, as described in Section 3.6.2.6.8 of the RI/FS, and as shown on Figure 3-39.

#165

COMMENT: Reference to Section 5.1.1.2 (RI/FS); Contamination at BOMARC Missile Site has been demonstrated to exist in discrete "hot spots". Therefore, it is not valid to eliminate sampling below 18 inches at such "hot spots" on the basis that a boring not immediately adjacent to the area in question (i.e., approximately 20 ft away) did not reveal contamination below two feet.

The missing front doors and sheet metal portion of the roof from Shelter 204 may be significant sources of contamination. This section is unclear as to whether these items are missing in the same manner as the missile launcher, or are simply not physically present, but are accounted for. If these items are in a known location, it should be stated in the document, including level of contamination and the remediation options. If the location of the items is unknown, then efforts should be made to locate them. [WR-00024(13)].

RESPONSE: First Paragraph - The lack of definition of the vertical extent of contamination at a single location is not seen as a significant issue. Confirmatory sampling will be performed as part of any active restoration alternative to confirm the depth of remediation. Sampling was not eliminated at this location based on the nearby boring referenced. This location was sampled using hand tools, and the predetermined total depth of sampling was 18 inches. The information on the depth of contamination in the nearby boring was included because it was the closest sampling point where the depth of contamination had been established.

Second Paragraph - This has been clarified. The location of the referenced items is unknown. Efforts to locate these items (geophysical surveys) were made during the RI. This will be clarified in the RI/FS report. Efforts to locate the items will be made in the same manner as efforts to locate the missile launcher, i.e., as part of any active restoration remedial alternative selected.

#177

COMMENT: Reference to Appendix D (RI/FS): Raw Field Data; Future reports should include maps to illustrate the locations for the air sampling, well purging, and surface water samples. The one map provided only shows the boring and coring points. [WR-00024(14)].

RESPONSE: The maps requested are provided in the text of the RI/FS report.

#182

COMMENT: It is understood that the chemical analyses data will be used in this report only to assess potential impacts on the remedial treatments due to their presence, and that the remediation of the chemical contaminants found (to include organic solvents) will be addressed under the Installation Restoration Program (IRP) RI/FS for McGuire AFB. [WR-00025(1)].

RESPONSE: That is correct. Another RI/FS for McGuire AFB is in preparation.

#187

COMMENT: Reference to Section 3 (RI/FS) - Field Investigation Program; The culvert under Route 539 should be sampled to determine if there is any contamination, unless this work has already been performed. [WR-00025(2)].

RESPONSE: The culvert will be sampled during the remedial design phase.

#191

COMMENT: Reference to Page 3-49 (RI/FS): Indicate whether or not the filter paper was wetted prior to wiping the test surface and if so, with what. [WR-00025(2)].

RESPONSE: This issue has been clarified in the final RI/FS. The filter paper was not wetted.

#192

COMMENT: Reference to Page 3-84 (RI/FS): The method used to sort the soil sample should be identified. [WR-00025(2)].

RESPONSE: The method used (sieving) was identified in the text.

#193

COMMENT: Reference to Page 3-86 (RI/FS): Explain the apparent discrepancy between the

number of holes drilled on this page versus Page 3-18 and Page 4-88. [WR-00025(2)].

RESPONSE: This has been clarified in the final RI/FS.

#194

COMMENT: Reference to Section 3 (RI/FS) - Field Investigation Program, Page 3-95; The Department does not recommend the use of hexane in its decontamination procedures for inorganics; but since pesticide grade hexane was used, deleterious effects are expected. [WR-00025(2)].

RESPONSE: Noted.

#195

COMMENT: Reference to Section 4 (RI/FS); It is stated "The wells sampled included PU-1 through PU-7 and MW-47 through MW-49." A total of 22 samples (both filtered and unfiltered) "were shipped to the laboratory to be analyzed for gross alpha and gross beta. Samples from three of the wells (with a fourth sample as a duplicate from well PU-7) were also analyzed for Pu-239 by alpha spectroscopy." Table 4-2 indicates that groundwater samples from five wells (PU-3, PU-6, PU-7, MW-48 and MW-49) were analyzed for Pu-239. A duplicate sample from Pu-7 (denoted as PU-10) was also analyzed for Pu-239. [WR-00025(3)].

RESPONSE: This issue has been clarified in the final RI/FS.

#196

COMMENT: Reference to Page 4-6 (RI/FS), Table 4-2; Explain the discrepancy in the number of wells sampled for Pu-239 in the table (5 wells) versus the text on Page 4-4, Paragraph 4 (4 wells). [WR-00025(3)].

RESPONSE: This issue has been clarified in the final RI/FS.

#197

COMMENT: Reference to Page 4-9 (RI/FS), Paragraph 1; Explain the discrepancy between Table 4-2 and the text. Table 4-2 indicates there are 8 samples where gross alpha activity exceeded 15 pCi/L and if the positive error factor is included, there are 12. The text indicated 9 samples exceeded 15 pCi/L and 4 of these exceeded the level only if their positive error factor was included. [WR-00025(3)].

RESPONSE: This issue has been clarified in the final RI/FS.

#198

COMMENT: Reference to Page 4-9 (RI/FS); It is stated that "A total of nine of the samples collected contained gross alpha in concentrations exceeding State and Federal Action Levels, only one of which was a filtered sample. Four of these samples, including the one filtered sample, exceeded the action level only if the positive error factor [ranging from +/- 2 pCi/L

to +/- 7 pCi/L] was added to the reported activity." Review of Table 4-2 indicates that a total of twelve (12) groundwater samples from eight of the ten wells sampled (including both duplicate samples) exceeded the action level for gross alpha (15 pCi/L) if the positive error factor is included. [WR-00025(3)].

RESPONSE: This issue has been clarified in the final RI/FS.

#199,200

COMMENT: Reference to Page 4-14 (RI/FS); It is stated that "the environmental investigation (Weston, 1989), performed in 1987, detected Pu-239 (0.9 +/- 0.3 pCi/L) in the first unfiltered ground water samples collected from well PU-4 after the well was installed. It was thought that the well may have been contaminated when it was constructed." [WR-00025(3)].

Although the presence of Pu-239 in PU-4 may be attributable to contamination during construction, plutonium was also detected in unfiltered groundwater samples from other wells at the site including PU-2, PU-3 and PU-7 (see Page 3-53 of the EIS). These wells may also have been contaminated during construction, but this has not been confirmed. [WR-00025(3)].

RESPONSE: Issue noted.

#201

COMMENT: Reference to Section 4 (RI/FS) - Results and Significance of Findings, Page 4-14: A general increase in gross alpha and gross beta activity was found toward the northeast at the site. It is stated that "Because none of the samples from the wells showed measurable plutonium, it would appear that the gross alpha and beta activities are not due to plutonium contamination. Due to local groundwater divide in the vicinity of monitor well PU-4, and the fact that the pH at the site averages 4.72, it is hypothesized that "low activity rainwater infiltrates the ground surface near well PU-4; as it migrates through the ground, it leaches those naturally occurring alpha emitters such as uranium and thorium."

Although this is a reasonable hypotheses, information must be provided to support it since infiltration of the low pH rainwater may also increase the solubility of plutonium. The required information may include published data on groundwater analyses and gross alpha and beta from wells in other areas of the Pinelands and/or sampling and analysis of groundwater from wells in both recharge and discharge areas of the Pinelands. Existing wells located at McGuire AFB (but preferably not the BOMARC Missile Site) may be used for this purpose. [WR-00025(3)].

RESPONSE: The Air Force has conducted additional groundwater sampling and analysis, the results of which support the stated hypothesis. Results are included in the final RI/FS.

#202

COMMENT: Reference to Section 4 (RI/FS) - Results and Significance of Findings, Page 4-15: It is stated that several volatile organic compounds (VOC's) were detected in monitor wells at the site. Some of these VOC's are attributed to laboratory contamination since they were also

detected in quality assurance/quality control (QA/QC) blanks. "Trichloroethylene and 1,2-dichloroethylene are shown to be present in ground water at the BOMARC Missile Site. The levels of these contaminants range from 8 µg/l to 81 µg/l."

The magnitude and extent of the VOC's contamination in groundwater at the site is currently being investigated under the IRP RI/FS for McGuire AFB. Because of the potential health risks associated with future use of groundwater at the site (if it is not remediated), the proposed remedial alternatives must include institutional controls (i.e., deed restrictions) at the site (see General Comments above). [WR-00025(4)].

RESPONSE: Chemical contaminants are the subject of an ongoing investigation at the site, and remedial measures required as a result of chemical contamination will be addressed within that context.

#204

COMMENT: Reference to Section 4 (RI/FS) - Results and Significance of Findings, Page 4-15, Paragraph 1; An incorrect statement is made that the 15 pCi/L standard for gross alpha was not exceeded. [WR-00025(4)].

RESPONSE: This issue is clarified in the final RI/FS.

#205

COMMENT: Reference to Section 4 (RI/FS) - Results and Significance of Findings, Page 4-15: It is stated that "All gross alpha and gross beta levels found were below the State and Federal Action Levels for drinking water, so no radiological hazard exists, even if these wells were used as a potable water source, which they are not."

As stated above, 12 samples from 8 wells were found to exceed the state and federal action levels for gross alpha (15 pCi/L). This level is the same as the Federal Maximum Contaminant Level (MCL) listed in the National Interim Primary Drinking Water Standards (NPDWS). The MCL for gross alpha excludes radon and uranium. Since the amount of alpha activity attributable to naturally occurring radon and uranium (or to anthropogenic plutonium) is not known, these levels are a concern and therefore must be considered in the proposed remedial alternatives. [WR-00025(4)].

RESPONSE: The Air Force has conducted additional groundwater sampling. Results are included in the FEIS and RI/FS.

#207

COMMENT: Reference to Section 4 (RI/FS) - Results and Significance of Findings, Page 4-72, Paragraph 3; Results of the HPG survey of soils at the site indicates that "Outside the BOMARC property fence, the highest activity was detected in the ponding area to the west of Highway 539 (Fort Dix property)." The impact to groundwater due to plutonium or its decay products is uncertain but assumed to be non-existent. No information is available regarding the

impact to groundwater due to the discharge of VOC's and rocket fuel in this area. [WR-00025(5)].

RESPONSE: Noted. Chemical contamination at the site is the subject of a separate ongoing investigation.

#208

COMMENT: Reference to Section 4 (RI/FS) - Results and Significance of Findings; A shallow monitor well must be installed downgradient of ponding area. This well must be sampled for Target Compound List (TCL) VOC's, TCL semi-volatile organic compounds (SVOC's), Target Analyte List (TAL) inorganics, total dissolved solids (TDS), gross alpha, gross beta and Pu-239 using alpha spectroscopy. Both filtered and unfiltered samples must be collected for the inorganic analysis. (The installation and sampling of this monitor well may be included in the ongoing RI/FS for McGuire AFB rather than the BOMARC Missile Site RI/FS). [WR-00025(5)].

RESPONSE: The Air Force does not agree that there is currently a need for groundwater monitoring for radioactive contaminants on the southwestern portion of the site. During a Technical Review Committee meeting held on April 13-14, 1989 and attended by EPA and NJDEPE, the Air Force solicited and received input on groundwater monitoring efforts. As a result of that meeting, it was agreed to sample ten monitoring wells in the vicinity of Missile Shelter 204, where the bulk of radioactive contaminants are found. This sampling has been accomplished.

A separate issue raised, which involves resampling of the ten wells to determine the specific radionuclides causing elevated gross alpha activity, is a valid issue, and the Air Force has conducted groundwater sampling to determine whether the elevated gross alpha activity is, in fact, caused by naturally-occurring radionuclides (see response to #'s 30, 33, 91, 94, 109, 188, 189). No radionuclides attributable to the missile accident were detected in wells surrounding the most heavily contaminated area on-site (the Shelter 204 area), so we conclude that there is no need to investigate groundwater in the much less significant potential source area located on the southwestern portion of the site.

#212

COMMENT: Reference to Section 4 (RI/FS) - Results and Significance of Findings, Page 4-131, Paragraph 2; While the "assigned value" may be less reliable than actual laboratory data, the fact that the value exceeds the U.S. background level by a factor of 33 is also significant. The correlation work in Appendix I was presented to support the use of the "assigned values" in place of the lost samples, it is inappropriate to discount the validity of this datum if similar type data are to be utilized elsewhere. [WR-00025(5)].

RESPONSE: Comment noted.

02.02.02.02 FATE AND TRANSPORT OF CONTAMINANTS

#43,44

COMMENT: The draft EIS does not discuss whether Pu-239 and Am-241 act similarly in the "TRU-Clean" process. Since all results of the test soils have been evaluated in terms of Am-241 activity, the resultant Pu-239 activity needs to be established before this system is to be used. In the discussion of soil properties important in plutonium and americium migration, the draft EIS indicates that "plutonium is preferentially bound to silt and very fine sand particles." However, two of the studies cited in Table 3-6 indicate binding of plutonium to clay is virtually equal to its binding with silt and very fine sand. Iron and manganese oxides in soil are strong absorbers of plutonium and should therefore be characterized to better understand plutonium retention. Accordingly, we recommend that the Air Force provide additional soil analysis information so we can properly evaluate plutonium retention at the site. Furthermore, the pH of the soils should be determined to characterize which ionic species is being absorbed. [WR-00014(4)].

The historical plutonium migration velocities cited in the draft EIS are for two specific plutonium compounds (i.e., PuO_2 and $\text{Pu}[\text{NO}_3]_4$). Since no species of plutonium is identified for the BOMARC Missile Site, it is unclear whether the plutonium present will behave in a similar manner. We believe that this information is necessary to adequately assess the radiological hazard and to evaluate alternative management and cleanup strategies. Accordingly, additional information should be provided which explains what type of material is present at BOMARC Missile Site and how it compares to historical velocities. [WR-00014(4,5)].

RESPONSE: Implementation of the Preferred Alternative (Off-site Disposal Alternative) would remove the potential for leaching of plutonium at the site, since all material contaminated above the cleanup level would be removed and transported to a licensed radioactive waste disposal facility. Implementation of the On-site Treatment Alternative would require additional testing prior to completion of the remedial design. Implementation of the NEPA No Action Alternative would involve continuing soil analysis to confirm plutonium retention at the site.

#30,91

COMMENT: Concerns the ability of plutonium to be transported through groundwater with soil colloids. [WR-00011(1), WR-00021(3)].

RESPONSE: See response to Comment #'s 30, 33, 91, 94, 99, 109, 188, and 189 under Section 02.02.02.01.

#31,92

COMMENT: It is then postulated in the RI/FS that the increase in gross alpha and beta activity is due to leaching of naturally occurring uranium and thorium by infiltration of low pH rainwater in the recharge area in the vicinity of well PU-4. Although this may be occurring to some degree, leaching of plutonium cannot be ruled out. [WR-00011(1), WR-00021(3)].

RESPONSE: See response to Comment #'s 30, 33, 91, 94, 109, 188, 189 under Section 02.02.02.01.

#104

COMMENT: Reference to EIS Appendix 8, - 2.1.1; Could resuspension rates have been more site specific, considering the dry, sandy soil indigenous to the Pine Barrens, rather than using the geometric mean of a range of resuspension rates for lightly vegetated soil? [WR-00022(3)].

RESPONSE: The final RI/FS and the FEIS will explain the basis for the resuspension rate that was used in the model runs.

#201

COMMENT: Concerns a general increase in gross alpha and gross beta in the northeastern part in of the site. [WR-00025(3)].

RESPONSE: See response to Comment #'s 30, 33, 91, 94, 109, 110, 188, and 189 under Section 02.02.02.01.

#209

COMMENT: On Page 4-86, Figure 4-13 of the RI/FS. The contours indicate a different distribution pattern than would be expected considering the prevailing wind direction at the time of the incident. Further explanation is desirable to clarify why a pattern such as depicted in Figure 4-32 was not observed. [WR-00025(5)].

RESPONSE: This has been clarified in the final RI/FS.

02.02.02.03 METHODOLOGY/ ASSUMPTIONS/ CALCULATIONS

#29

COMMENT: The doses and risks to off-site populations presented in both Section 4 and Appendix 8 are reasonable estimates. Although we did not have access to the input parameters used in the GENII code (Annex 1 of Appendix 8), the information in the text of Appendix 8 presented enough information about the source term for us to run our own dose estimate calculations to off-site populations. Our calculations substantiate the results presented in Section 4 of the DEIS regarding dose estimates to off-site population. [WR-00010(1)].

RESPONSE: Noted.

#67

COMMENT: In light of the possible difficulties in modeling "hot spot" contamination at the BOMARC Missile Site, we recommend that the Air Force clarify the use of RESRAD as an appropriate analytical tool for estimating dose rates and deriving soil cleanup goals. When all input parameter values and assumptions have been identified, the Air Force should perform a RESRAD run based on-site-specific data (i.e., actual soil concentrations), rather than runs based on normalized unit area or mass concentration data. This should be followed by both uncertainty and sensitivity analyses. [WR-00020(2)].

RESPONSE: The Air Force feels that the models in the RESRAD code are an appropriate methodology for the BOMARC Missile Site. The code was written specifically for deriving allowable residual concentrations of radionuclide in soil.

Guidance on non-homogenous distribution of contamination will be incorporated in to the model runs.

Unit concentration runs will be replaced with "actual value" runs. The sensitivity analysis in RESRAD, which varies a single parameter at a time, will be utilized. A discussion of uncertainties has been added.

#69

COMMENT: Further clarification of the baseline risk assessment and RESRAD program is needed, so that we may evaluate the applicability or credibility of the calculations. Specifically, we request a clearer presentation of default and site-specific parameters used in the RESRAD program. [WR-00020(2)].

RESPONSE: Values used for parameters in the modeling of radiological impacts will be presented in the RESRAD output tables of Annex 2, Appendix B.

#72

COMMENT: Why are results of the hazard assessments based on recent surveys when over 30 years of data have been collected? [WR-00020(4)].

RESPONSE: See response to Comment #'s 72 and 157 under Section 02.02.02.01.

#73,158

COMMENT: The unit concentration approach employed in the RESRAD modelling involves the use of normalized unit mass or unit area concentrations, instead of actual soil concentration data, to calculate dose rates to the maximally exposed individual. The committed effective dose equivalent dose rate estimates, in mrem per year (resulting from a RESRAD run using this approach) must be re-divided by the initial unit area or mass concentration to provide a final result in terms of mrem per year per $\mu\text{Ci}/\text{m}^2$ or mrem per year per pCi/m^2 . This approach may be convenient for scaling dose rate estimates up or down depending on soil concentration data selected and, as demonstrated in the SAIC report, leads to equivalent results. However, in our opinion it is unnecessarily confusing and should be avoided. As suggested in our November 6, 1991 letter regarding the review of radiological surveys and baseline risk assessment for the BOMARC Missile Site, the most straightforward approach involves the direct use of site-specific soil concentration data. This results in a total dose rate estimate that does not require further manipulation. This is the approach used in the recent RESRAD runs performed by SAIC to verify previous unit concentration calculations. [WR-00020(5), WR-00024(10)].

RESPONSE: A RESRAD run using actual site average Pu-239 levels will be included in the FEIS. All other assumptions the same, the dose rate calculated in the EIS will not change.

#74,159

COMMENT: According to the DOE's A Manual for Implementing Residual Radioactive Material Guidelines (DOE/CH/8901, June 1989), RESRAD is used to derive guidelines for allowable concentrations of residual radioactive material in soil. It assumes a homogenous contamination of large areas (several hundred square meters or more) with the distribution of radionuclides averaged over any 100-m² area and depth of 0.15-m-thick layer. As described in the EIS and RI/FS reports, radioactive contamination at BOMARC Missile Site is non-uniformly distributed over the site in 'hot spots', at various depths, and activity levels, and involves structural components of the missile shelter, manholes, soil in the shelter area, asphalt, concrete, and materials and sediments in the primary drainage ditch. While the above referenced manual provides additional guidelines and criteria for dealing with inhomogeneous contamination (see Section 3.3), we found no evidence in either assessment that this guidance was applied. We suspect, therefore, that the RESRAD runs for both assessments fail to model the site adequately and that, as stated on Page 51 of the DOE manual, "the presence of hot spots could potentially pose a greater risk of exposure to individuals using the site than the risk associated with homogenous contamination." [WR-00020(5), WR-00024(11)].

RESPONSE: The discussions of hot spots and non-homogeneous contamination contained in DOE/CH/8901 have been reviewed and incorporated into the assessment.

Note: RESRAD "assumes" whatever parameter values are used as input; a 15-cm contamination depth, for instance, is not locked into the code.

#75,160

COMMENT: The approach used for the analyses reported in the EIS and RI/FS does not follow the guidance suggested by EPA for risk assessment under the Superfund program. Chapter 10, "Radiation Risk Assessment Guidance", of EPA's Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part A - Baseline Risk Assessment) EPA/540/1-89/002 (December 1989), recommends a two-phase evaluation: (1) estimation of the dose equivalent rate to individuals using ICRP and EPA (Federal Guidance Report No. 11) methodologies to compare dose rate results with radiation protection standards and criteria; and (2) estimation of the health risk to individuals based on the age averaged lifetime excess cancer incidence per unit intake or exposure to compare risk results with EPA's remedial risk range, e.g., 10⁻⁶ to 10⁻⁴ lifetime excess total cancer risk. Exposure parameters (duration, frequency, and intake values) should be consistent with those provided in Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual Supplemental Guidance: "Standard Default Exposure Factors." (Interim Final) OSWER Directive 9285.6-03 (March 25, 1991). [WR-00020(6), WR-00024(11)].

RESPONSE: The current analysis follow the suggested guidance fairly closely:

1. Dose equivalent rates were calculated using ICRP and DOE methods;
2. Health risks to the population were estimated.

The exposure parameter values in EPA's OSWER Directive 9285.6-03 are used.

#84

COMMENT: There is also disagreement with the Air Force's use of average concentrations. The contamination at the BOMARC Missile Site is not uniformly distributed and localized "hot spots" are found around the site. The baseline risk assessment does not adequately address the fact. The doses derived based on uniform distribution would underestimate the risk associated with the use of this land. [WR-00021(2)].

RESPONSE: The discussion of hot spots and non-homogeneous contamination contained in DOE/CH/8901 has been incorporated into the assessment as appropriate.

#85

COMMENT: The Air Force is not using the latest version of a computer model (RESRAD) which it uses to calculate acceptable doses to the lung and bone. [WR-00021(2)].

RESPONSE: The RESRAD Version 4.1 is now utilized.

#71

COMMENT: Significant parts of the data sets are incomplete and/or not fully documented and some discussion of the baseline risk is inadequate. This made it difficult to identify, verify and evaluate key modeling assumptions and parameters such as activity concentrations in environmental media (soil, air, water, biota), the Pu-239/Am-241 activity ratio, source characteristics (areal and vertical extent of contamination, degree of homogeneity), and exposure conditions (duration, frequency). We recommend the inclusion of data summary tables and additional explanatory text. [WR-00020(4)].

RESPONSE: The Appendix containing details of the risk assessment has been expanded and rewritten. Major modeling assumptions are stated in the text of the Appendix and all parameter values are listed in the Annex.

#87

COMMENT: Staff did not get the same answers when it ran calculations (Baseline Radiological Assessment) with the same input parameters. An example is the derivation of doses to the lung and bone. [WR-00021(2)].

RESPONSE: The methodology for the radiological assessment has been modified. An effective dose equivalent limit of four mrem per year was used as input into RESRAD and

to calculate the soil guideline. This dose represents an excess lifetime cancer risk of 10^{-4} to 10^{-6} . See response to Comment #128 for a detailed discussion.

#88

COMMENT: The output of RESRAD is a site specific soil criteria. The Air Force did not use the one calculated by RESRAD. The Air Force appear to be using an intermediate output of RESRAD, the Dose to Source Ratio (DSR). The Air Force the DSR and then uses EPA's soil guidance to determine a clean-up level. The soil criteria calculated by RESRAD is $110 \mu\text{Ci}/\text{m}^2$ for Pu-239. The EPA guidance is $0.2 \mu\text{Ci}/\text{m}^2$. The Air Force criteria was calculated using RESRAD's DSR is $3 \mu\text{Ci}/\text{m}^2$. If the soil criteria from RESRAD was not used, then what justifies the use of the DSR? The discrepancies between these three levels should be explained. [WR-00021(2)].

RESPONSE: The approach to the radiological assessment was modified. The clean up level is now based directly on the output from RESRAD. An effective dose equivalent of 4 mrem per year will be used as the input into RESRAD for the soil guideline. This dose represents an excess lifetime cancer risk of 10^{-4} to 10^{-6} . The cleanup criterion will be expressed in units of pCi/g. See response to Comment #128 for a detailed discussion.

#89,123,223

COMMENT: The use of default vs. site specific values as inputs into the RESRAD model should be explained. [WR-00021(2), WR-00022(5), WR-00025(7)].

RESPONSE: Site-specific parameter values have been used where available. Where they were not available, default values were used.

#90

COMMENT: There is not a logical progression between the baseline risk assessment and radiation exposure calculations. [WR-00021(2)].

RESPONSE: This section was revised.

#103

COMMENT: Reference to EIS Appendix 8 - 2.1.1; Deriving cleanup criteria using a uniform concentration is not appropriate at this site. [WR-00022(3)].

RESPONSE: Non-homogenous distribution of contamination has been incorporated into the model runs.

#104

COMMENT: Concerns site-specific resuspension rates. [WR-00022(3)].

RESPONSE: See response to Comment #104 under Section 02.02.02.02.

#105

COMMENT: Reference to EIS Appendix 8, Section 2.1.1; The Air Force diluted the effect of the 7,118 m² area by averaging 63 $\mu\text{Ci}/\text{m}^2$ with the 21,470 m² area that averages only 0.3 $\mu\text{Ci}/\text{m}^2$. What is the explanation for this dilution? [WR-00022(3)].

RESPONSE: The area of higher concentration is accounted for, but only in proportion to its area. The area of higher concentration is small, relative to the overall area of the site, and its small area accounts for the "dilution." Note: these areas and these associated contamination levels have changed.

#106,124,224

COMMENT: The release rate calculated is not the same used in the GENII run in Appendix J. The source term input is 74 $\mu\text{Ci}/\text{yr}$ instead of the 915 $\mu\text{Ci}/\text{yr}$ calculated using the "unit" concentration. Were the results then scaled by 28 instead of 15.9? [WR-00022(3), WR-00022(5), WR-00025(7)].

RESPONSE: The release rate used as the basis for both calculations is 915 $\mu\text{Ci}/\text{yr}$. GENII runs were scaled as necessary to obtain this release rate. Release rates have been recalculated, and GENII runs in the two documents are now identical.

#107

COMMENT: Reference to EIS Appendix 8, Section 2.1.1; Why did the Air Force chose 100 mrem year as input to RESRAD for an acceptable dose for unrestricted access, when the EPA based guideline dose rates are based on 4 mrem per year? [WR-00022(3)].

RESPONSE: This has been changed. An effective dose equivalent of 4 mrem per year has been used as the input into RESRAD as the soil guideline dose limit.

#112,206

COMMENT: Reference to Page 4-37 (RI/FS); Were the MESOI2.0 results scaled? Whenever results are scaled, this should be shown clearly in the RI/FS. This is a problem throughout the document and Appendices. Conclusions reported in Appendix H should be included in this section as well to make reading/reviewing easier. [WR-00022(4), WR-00025(4)].

RESPONSE: This issue has been clarified in the final RI/FS and FEIS.

#114,213

COMMENT: Reference to Page 4-157 (RI/FS); Were the GENII results scaled? Scaling results should be clearly shown in calculations. Also see comments under Appendix J. Are the values in Table 4-40 scaled? It appears that they are, but again there is no explanation or examples showing this scaling factor. [WR-00022(4), WR-00025(5)].

RESPONSE: This issue has been clarified in the final RI/FS and FEIS.

#120,221

COMMENT: As stated in this Appendix (RI/FS), there is much uncertainty associated with the modeling, specifically the weather conditions, height of release, and material available for release. There also is great uncertainty in the validity of the FIDLER readings (measurement and calibration procedures, definition of the lower limit of detection, etc.). How, then could one of the Air Force's conclusions be: "The fact that well defined patterns were predicted by MESOI 2.0, and none were found, argues that no measurable ground contamination occurred from the Pu plume released during the fire." This sentence should be eliminated from the text. It appears the only conclusion to be drawn is that no conclusion could be reached from this exercise. [WR-00022(5), WR-00025(6)].

RESPONSE: The text of the RI/FS has been modified to incorporate this comment.

#151

COMMENT: Reference to Section 4.1.3.8.5 (RI/FS); The "energy ranges of interest" should be identified. [WR-00024(8)].

RESPONSE: These have been identified in the final RI/FS.

#164

COMMENT: The estimated volumes in Table 5-3 of the RI/FS do not account for materials currently stored on-site from past investigations. The manner in which these material are to be addressed should be identified [WR-00024(12)].

RESPONSE: These materials will be addressed through an existing Air Force contract for disposal of radioactive waste.

#185

COMMENT: There are some fundamental problems with the derivation of the Site Specific Soil Screening Level (SSSSL) of $3.0 \mu\text{Ci}/\text{m}^2$. [WR-00025(2)].

RESPONSE: The approach to the radiological assessment has been modified. The cleanup level will be based directly on the output from RESRAD. An effective dose equivalent limit of 4 mrem per year will be used as the input into RESRAD for the soil guideline. This dose represents an excess lifetime cancer risk of 10^{-6} to 10^{-4} . The cleanup criterion will be expressed in units of pCi/g. See Comment #128 under Section 01.

02.02.02.04 EXPOSURE/PATHWAYS

#66

COMMENT: The Air Force should identify all exposure parameter values (exposure duration, exposure frequencies, intake rates for air, water, soil) and assumptions for the farm family scenario. These values and assumptions should be checked for consistency with those provided in EPA's Office of Solid Waste and Emergency Response (OSWER) Directive 9285.6-03,

"Standard Default Exposure Factors: (March 1991). In particular, we suggest that the Air Force discuss the discrepancies between parameter values or assumptions presented in the draft EIS and those in the OSWER Directive.[WR-00020(2)].

RESPONSE: All exposure parameter values are identified in the RESRAD output. The exposure parameter value in EPA's OSWER Directive 92856-03 is used in the final RI/FS.

#76,161

COMMENT: Why hasn't the soil ingestion exposure pathway been included in the farm family exposure scenario for RESRAD modeling? In the baseline RESRAD runs, why is the calculated dose rate zero at years 50 and 100? Statements made in the RI/FS and EIS suggest that Pu-239 and Am-241 have not migrated to a large extent in soil since their deposition 31 years ago. [WR-00020(6), WR-00024(12)].

RESPONSE: The soil ingestion pathway is included in the revised calculations.

The calculated dose rate drops to zero probably due to the simulated erosion of surface soil, and the loss of surface contamination.

#102

COMMENT: Reference to EIS Appendix 8 - Section 1.1; A soil ingestion pathway should be included. The default ingestion rate is 36.5 g/yr. Without this pathway, the ingestion dose could be underestimated. [WR-00022(3)].

RESPONSE: This pathway is included in RESRAD Version 4.1. Version 4.1 was used for the analysis completed in the risk assessment.

#186

COMMENT: Reference to Page ES-9 (RI/FS): The rationale behind the use of the HMEI to obtain an upper bound estimate of risk is acknowledged; however, the use of the Reasonable Maximum Exposure (RME) may have been more appropriate according to EPA risk assessment guidance (risk Assessment Guidance for Superfund, December 1989). Additionally if one utilizes an upper bound to evaluate a situation, it may be beneficial to also examine a lower bound estimate so that the full range of options available may be examined. It is recommended that this be done using the RME in conjunction with the HMEI. [WR-00025(2)].

RESPONSE: The HMEI risk scenario was employed due to the difficulties inherent in bounding exposure scenarios that are projected thousands of years into the future. Due to difficulties in controlling the site thousands of year in the future, no rationale for predicting a reasonable exposure could be developed.

02.02.02.05 SENSITIVITY AND UNCERTAINTY ANALYSES

#67

COMMENT: Uncertainty and sensitivity analyses should be conducted on RESRAD output data. [WR-00020(2)].

RESPONSE: The sensitivity analysis in RESRAD, which varies single parameter at time, will be utilized to identify parameters that the code is sensitive to.

#186

COMMENT: Concerns the use of HMEI to obtain an upper bound estimate of risk. [WR-00025(2)].

RESPONSE: See response to Comment #186 under Section 02.02.02.04.

02.02.02.06 CLEANUP STANDARDS/RISK LEVELS/ARARs

#42

COMMENT: An issue of particular concern to EPA is the use of the Nuclear Regulatory Commission's (NRC) Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors" in determining the threshold limit for deciding what materials can remain on the site. It is not clear whether these guidelines are appropriate to determine the cleanup levels in the remediation of the plutonium-contaminated site. We believe this issue should be addressed prior to the preparation of the FEIS. [WR-00014(4)].

RESPONSE: These guidelines are contamination limits for structures and equipment, not soil. DOE (Order 5400.5) and NRC (Reg Guide 1.86) guidelines are essentially identical, and were used because they are accepted by these regulatory agencies. No other appropriate guidance is available.

#53

COMMENT: The Pinelands Protection Act (N.J.S.A 18A-1 et seq.) and the Pinelands Comprehensive Management Plan (N.J.A.C 7:50-1.1 et seq.) are Applicable or Relevant and Appropriate Requirements (ARARs) as defined by CERCLA. [WR-00017(1)].

RESPONSE: As part of the FS, the alternatives were carefully evaluated for consistency with ARARs, including the two regulations mentioned above. The Preferred Alternative (off-site disposal) is consistent with New Jersey Pinelands Regulations.

#68

COMMENT: We do not agree with the Air Force's suggestion to use the derived BOMARC Missile Site SSSSL of 3.0 $\mu\text{Ci}/\text{m}^2$ as the remediation goal for the BOMARC Missile Site. Rather, we suggest the Air Force use levels of impact criteria as identified in the draft EIS for air, ground water, and surface water to set the overall site remediation goals for radionuclides in all pathways to a level corresponding to an individual lifetime excess total cancer risk of 10^{-4} or less. In a related matter, we suggest that the Air Force consult with the NRC on its plans

to develop residual activity criteria which will replace the surface contamination limits specified in Regulatory Guide 1.86. [WR-00020(2)].

RESPONSE: The current approach to the radiological assessment has been modified. The cleanup level is based on the output from RESRAD. An effect dose equivalent of 4 mrem per year is used as the input into RESRAD for the soil guideline. The dose represents an excess lifetime cancer risk of 10^{-4} to 10^{-6} . The cleanup criterion is expressed in units of pCi/g. See response to Comment #128 under Section 01 for a detailed discussion.

The following additional modifications will be made:

- RESRAD Version 4.1 will be utilized
- Guidance on non-homogenous distribution of contamination will be incorporated into the model runs.
- The exposure parameter values in EPA's OSWER Directive 9285.6-03 will be used.
- The RI/FS and EIS both indicate the reason for the resuspension rate that was used in the model runs as appropriate.
- The sensitivity analysis in RESRAD, which varies a single parameter at a time, will be utilized.

#77,153

COMMENT: Reference to Section 4.1.5.1 (RI/FS); The $3.0 \mu\text{Ci}/\text{m}^2$ calculated SSSSL is identified in this section, and used subsequently throughout the RI/FS. As with our earlier comments, we recommend that instead of this derived limit, ARARs be used for air, ground water, and surface water. An overall site remediation goal, for all radionuclides in all pathways, should be set to a level corresponding to an individual lifetime excess total cancer risk of 10^{-4} or less. Specifically, the SSSSL of $3.0 \mu\text{Ci}/\text{m}^2$ calculated for BOMARC Missile Site should not be used as a risk-based remediation goal for the following reasons.

The 1977 proposed EPA guidelines for exposures to transuranic (TRU) elements in the environment (1 millirad (mrad) per year to the pulmonary lung or 3 mrad per year to the bone), which is used as the basis for the SSSSL derivation, is not a potential ARARs. The proposed TRU guidelines have been neither finalized by EPA nor signed into law by the President. They are still undergoing revision to bring risk methodologies into consistency with current practices, and to ensure that the guidelines are compatible with other guidance under development by EPA. [WR-00020(6), WR-00024(8)]

RESPONSE: See response to Comment #68 in this section.

#78,79,153

COMMENT: The $0.2 \mu\text{Ci}/\text{m}^2$ soil "screening level" was not included in the TRU guidelines as a "de facto" standard, but rather as a conservative estimate of a soil concentration (to a depth of 1 cm) that could reasonably be expected to give rise to dose rates below 1 mrad per year to the lung or 3 mrad per year to bone. Its purpose was to reduce the land areas requiring

evaluation and to minimize the number of measurements needed. Areas which did not exceed the "screening level" would generally be considered in compliance with the guidance recommendations; those that exceeded it would require more intensive evaluation to determine actual dose rates to exposed persons. The soil "screening level" was derived for a hypothetical TRU-contaminated site whose soil characteristics and Pu-239 concentrations were identical to those at the Rocky Flats Plant in Colorado. EPA never intended, nor has it ever recommended, that soil screening levels be calculated for TRU elements on a site-specific basis.

Notwithstanding the points above, the SSSSL for the BOMARC Missile Site was calculated incorrectly. First, the BOMARC Missile Site SSSSL was calculated assuming a contamination depth of 5.1 cm, not 1 cm as used in the EPA soil screening level calculation. Second, implicit in the EPA level was the assumption of uniform soil contamination (for Pu-239 contaminated particle sizes under 2 mm to a depth of 1 cm), whereas the BOMARC Missile Site level is based on non-uniformly distributed Pu and Am in the soil and structural materials at varying depths and activity concentration levels. [WR-00020(6,7), WR-00024(9)].

RESPONSE: See response to Comment #68 in this section.

#99,115,163

COMMENT: The major comments are associated with the SSSSL of $3.0 \mu\text{Ci}/\text{m}^2$. There are some fundamental problems with the derivation of this level. Changing this value will affect the volume estimates, cost estimates, land use, and environmental consequences. [WR-00022(2), WR-00022(4), WR-00024(12)].

RESPONSE: See response to Comment #68 in this section.

#80,162,166

COMMENT: EIS Table 2-1 (NRC Reg. Guide 1.86 Summary):

- Limits do not account for the depth or volume of contaminated material.
- Limits do not equate to dose or risk levels.
- Procedures and detection limits of instruments may not be sensitive enough to meet the release limits.
- NRC is currently replacing Regulation Guide 1.86 with new residual radioactivity guidelines to account for these deficiencies.[WR-00020(7), WR-00024(12), WR-00024(13)].

RESPONSE: These limits are used in the RI/FS for structures - not soil. NRC is in the process of developing information that will apparently replace Regulation Guide 1.86. However, this process may take several years to complete. The Regulatory Guide will continue to be used as guidance.

#83

COMMENT: Dose objective of 100 mrem per year for Unrestricted Access Alternative is not appropriate.

RESPONSE: The soil cleanup level is now based on a dose of 4 mrem per year.

#84

COMMENT: There is also disagreement with the Air Force's use of average concentrations. The contamination at the BOMARC Missile Site is not uniformly distributed and localized "hot spots" are found around the site. The baseline risk assessment does not adequately address the fact. The doses derived based on uniform distribution would underestimate the risk associated with the use of this land. [WR-00021(2)].

RESPONSE: The discussion of hot spots and non-homogeneous contamination contained in DOE/CH/8901 has been reviewed, and incorporated into the assessment as appropriate.

#130

COMMENT: Reference to Section 5.1.1.3.2 (RI/FS); In the Action-Specific Requirements on Page 5-18, it is stated that prevention of significant deterioration (PSD) regulations may be an ARARs for the site. It should be noted that radionuclides are no longer PSD affected pollutants. Of course, PSD may be applicable to activities at the site which may lead to significant air emissions of any other PSD affected pollutant. However, given the potential remedial activities described and the small area covered by this site, it appears unlikely that this would occur. [WR-00024(3)].

RESPONSE: This information has been incorporated into the final RI/FS and EIS.

#171

COMMENT: Reference to Section 5.2.3.3 (RI/FS); To clarify the statement that "the quantity of Pu unaccounted for by site characterization efforts is sufficient that it would pose high risks...", the risk should be quantified. [WR-00024(14)].

RESPONSE: The estimate of unaccounted for Pu-239 has been reduced. The risk quantification is provided in the EIS (Unrestricted Access Alternative).

#179

COMMENT: The ARARs cited include the National Historic Preservation Act (NHPA). However, the RI/FS states that it is unknown whether the BOMARC Missile Site area has been specifically studied. A determination of the presence of, and potential impacts on, cultural resources, in compliance with the NHPA, is a necessary component of the RI/FS process. At this point in the CERCLA process, such a study should include a determination of the presence or absence of historic or prehistoric resources in each of the study area where earth-disturbing activities would occur. This process is referred to as a Stage I Survey. Historical information may be included in studies performed for McGuire AFB or Fort Dix, or information can be

obtained from the New Jersey State Historic Preservation Office. These and other sources should be used to assist the archaeologists carrying out the survey in determining the nature and extent of any necessary subsurface testing. Additionally, a copy of the survey should be forwarded to the EPA.

A determination should be made of the presence or absence of, and direct or indirect impact on, significant agricultural lands, pursuant to the Farmland Protection Policy Act of 1981 (7 USC 4201 et seq.) and the Farmland Protection Policy Act of 1981 (7 CFR 658). The Soil Conservation Service and the local Soil Conservation District should be contacted. [WR-00024(15)].

RESPONSE: Second and Third Paragraphs - The site surface and subsurface have been heavily disturbed from construction activities. The Off-site Disposal Alternative would not disturb any new area. Information on prime agricultural lands has been obtained. Impact of the Preferred Alternative on prime agricultural lands has been included in the FEIS.

#218

COMMENT: Reference to Section 5 - Alternative Remedial Measures (RI/FS); Remedial action goals are listed. The proposed remedial alternative do not comply with all of these goals since they do not address contaminated groundwater at the site. [WR-00025(6)].

RESPONSE: The contamination referred to is chemical, not radioactive contamination. As stated earlier, chemical contaminants are to be investigated and remediated under a separate, ongoing program.

02.02.02.07 PRESENTATION AND COMPLETENESS OF DATA

#71

COMMENT: There are gaps in the data sets for the baseline risk assessment. [WR-00020(4)].

RESPONSE: See response to Comment #71 under Section 02.02.02.03.

#98,184

COMMENT: The overall organization of the material is poor. The RI/FS is hard to follow because of missing Figures/Plates/Annexes, no explanation of the mathematical manipulation of data, no follow through on calculations, the representation of similar data in separate sections, and basic conclusions buried in Appendices. The Air Force should try to arrange the material so that it can be reviewed logically without the need to acquire reference documents. [WR-00022(2), WR-00025(1,2)].

RESPONSE: The RI/FS was prepared in a logical organized manner and follows the EPA and Air Force recommended formats for these reports. Information that was missing from the Draft RI/FS has been added to the final document.

#113

COMMENT: Reference plates are missing from the RI/FS. Are they in a separate document? [WR-00022(4)].

RESPONSE: Reference plates have been provided in the final RI/FS.

#122,222

COMMENT: This entire Appendix (Appendix J- RI/FS) lacked sufficient information to perform a comprehensive review. In future revisions, please explain all derived dose rates and show calculations. [WR-00022(5), WR-00025(7)].

RESPONSE: Appendix J has been extensively revised to address this general comment.

#121

COMMENT: All the figures in Appendix A of the RI/FS are missing. [WR-00022(5)].

RESPONSE: The figures have been added to the final RI/FS.

#143

COMMENT: Figures 1-2, 1-3, and 1-4 referred to in Section 1.4 of the RI/FS are missing. [WR-00024(7)].

RESPONSE: This has been corrected in the final RI/FS.

#156

COMMENT: Significant parts of the data sets are incomplete and/or not fully documented, and some discussion of the baseline risk assessment is incomplete. This made it difficult to identify, verify and evaluate key modelling assumptions and parameters, such as activity concentrations in environmental media (soil, air, water, biota), the Pu-239/Am-241 activity ratio, source characteristics (areal and vertical extent of contamination, degree of homogeneity), and exposure conditions (duration, frequency). Accordingly, we recommend the inclusion of data summary tables and additional explanatory text. [WR-00024-(10)].

RESPONSE: The Appendix supporting the risk assessment has been rewritten.

#181

COMMENT: (RI/FS). Columns 39, 40, and 41 on the "In-Site Survey Sampling Stations (Plate 4-10" are incorrectly numbered. Also, priority should be given to finding the missile launcher. [WR-00024(15)].

RESPONSE: The plate has been renumbered. For the second comment, see response to Comment #11 under Section 02.01.

#211

COMMENT: Page 4-128 (RI/FS), Paragraph 3; The figure citation "3-13 and 3-14" is incorrect. [WR-00025(5)].

RESPONSE: This has been corrected.

#222

COMMENT: The entire Appendix J lacks sufficient information to perform a comprehensive review. In future revisions, please explain all derived dose rates and show calculations. [WR-00025(7)].

RESPONSE: The Appendix has been rewritten and the risk assessment methodology revised; derived dose rates are no longer used.

02.03 RELEVANT FEDERAL, STATE AND LOCAL STATUTES, REGULATIONS, AND GUIDELINES

#24

COMMENT: Under current Federal Regulation, a Department of the Army permit is required for any actions involving the placement or discharge of fill material into the waters of the United States and adjacent wetlands. It appears that a cedar swamp habitat exists within the study area and may be impacted under the Off-site Disposal and On-site Treatment Alternatives. A Department of the Army permit would be required prior to any site work which may impact this habitat. [WR-00007(1)].

RESPONSE: At the present time, the Air Force does not anticipate cedar swamp area will be affected by site remediation under the Preferred Alternative (off-site disposal) or any other alternative under consideration. It is anticipated that disturbance will be limited to areas already disturbed by past construction. The Air Force will employ sediment control measures such as construction of silt fences, berms, diversion ditches, sediment traps and retention basins. Activity will be staged to minimize the area the potential for disturbance and off-site transport of contaminated material. If the remedial design will require a 404 permit, a permit would be obtained prior to initiating site work.

#54

COMMENT: The remediation process proposed under On-site Treatment Alternative and Off-site Disposal Alternative would require completion of an application with the commission for a permit equivalency [WR-00017(1)].

RESPONSE: The Air Force will meet all applicable permit requirements.

#55

COMMENT: Waste water generated must be treated to comply with the non-degradation standard contained in N.J.A.C 7:50 - 6.83(6) prior to on-site discharge. [WR-00017(1)].

RESPONSE: Under the Preferred Alternative (off-site disposal) all contaminated water will be collected and containerized for proper treatment and/or off-site disposal.

03 ALTERNATIVES CONSIDERED FOR ACTION

03.01 UNRESTRICTED ACCESS ALTERNATIVE

#36,50

COMMENT: The Unrestricted Access Alternative should be eliminated from consideration. [WR-00014(1), WR-00016(1)].

RESPONSE: The unrestricted access alternative was included in the DEIS only as a hypothetical scenario. Although not considered reasonable by the Air Force, it was evaluated as a worst-case scenario to inform the public of the environmental impacts associated with unrestricted access.

03.02 NEPA NO ACTION (EXISTING CONDITIONS) ALTERNATIVE

#9,25,7

COMMENT: The site should be left undisturbed but that access be restricted and current maintenance and monitoring practices continued. [WR-00003(1), WR-00008(2), OR-00001(18)].

RESPONSE: During the FS, the Air Force screened and evaluated in detail six alternatives in terms of health and environmental protection, technical feasibility, cost, institutional requirements and state/public acceptance. The NEPA No Action Alternative has been fully evaluated and is considered a reasonable alternative.

#39

COMMENT: The NEPA No Action Alternative should be considered only as a short-term management strategy [WR-00014(3)].

RESPONSE: Same as preceding response above.

#37

COMMENT: The No-Action Alternative should include an evaluation to determine whether a cap or fencing is needed, and an analysis of contamination inside the culvert area. [WR-00014(2)].

RESPONSE: The NEPA No Action Alternative is defined as the continuation of current management and operational procedures. These procedures include visual inspections to document site conditions, posting of signs and installation of fencing, periodic radiologic surveys at the site, and corrective actions if conditions warrant.

#174

COMMENT: Evaluation of cost for a thirty year time period is insufficient given the 24,000 year half-life of Pu-239. Control of this site under this alternative is perpetual; thus, associated costs will be higher than stated here. [WR-00024(14)].

RESPONSE: A standard cost projection procedure for comparative purposes was used, and a thirty year time period was selected for comparative purposes. The fact that costs associated with this alternative will be higher than those estimated for a thirty year period of performance is noted in the text.

03.03 LIMITED ACTION ALTERNATIVE

#38

COMMENT: Potential management strategies should be extended to include the culvert and ponding areas. Additional information concerning the frequency of monitoring and selection of well site should be presented. [WR-00014(2)].

RESPONSE: Potential management strategies include access restriction in the ponding area. The strategy on management of the culvert and ponding areas and frequency of monitoring will be developed in the remedial design phase.

#39

COMMENT: The Limited Action Alternative is attractive only as a short-term management strategy. [WR-00014(3)].

RESPONSE: Comment noted; the Limited Action Alternative was evaluated as a short-term and long-term alternative for the site.

#4

COMMENT: The site should remain undisturbed, but with efforts made to locate the rocket launcher. Monitoring and institutional controls should be continued. [OR-00001(30)].

RESPONSE: The missile launcher will be removed, if it can be located, under the Off-site Disposal Alternative, or the Limited Action Alternative, or the On-site Treatment Alternative. Two alternatives, NEPA No Action and Limited Action, provide for long term monitoring and institutional controls at the site.

03.04 ON-SITE TREATMENT

#17

COMMENT: After adequate buffering and fencing, "on-site" decontamination of the soil should be undertaken. [WR-00005(1)].

RESPONSE: The On-site Treatment Alternative provides for decontamination of contaminated materials and soils onsite.

#26

COMMENT: The "TRU-CLEAN" procedure is a viable option, but only if: (1) Lockheed can guarantee a near 0% chance of incident at any point throughout their process, and (2) the plutonium collected does in fact go to the Nevada repository. [WR-00008(2)].

RESPONSE: Comment noted; the TRU-Clean is a reasonable safe and effective means of decontaminating radioactive soils. The contaminated soil will be disposed of in a licensed radioactive waste disposal site. The Air Force would use the Nevada Test Site or other reasonable licensed facility.

#27

COMMENT: The commentor strongly recommends selection of the Off-site Disposal or On-site Treatment Alternatives. [WR-00009(1)].

RESPONSE: Off-site disposal is the Preferred Alternative. However, on-site treatment is also a fully reasonable alternative.

#41

COMMENT: Off-site disposal and on-site treatment are the only alternatives that offer permanent solutions to contamination problems. A site-specific contingency plan, consistent with the National Contingency Plan, should be considered. The preparation of such a plan should be discussed in future NEPA documents [WR-00014(4)].

RESPONSE: The two alternatives cited above provide for removal of the source of potential contamination. The Air Force has conducted an RI/FS and EIS at the BOMARC Missile Site to ensure that opportunities for public and agency comments are maximized. The Air Force will initiate and develop a site specific plan that expedites remedial activities at the site prior to initiating remedial action at the site.

#40

COMMENT: To prevent sedimentation and erosion, documentation should be provided which describes erosion and sedimentation control plans, The depth of soil contamination should also be accurately defined. [WR-00014(3)].

RESPONSE: Site specific erosion and sedimentation control plans will be developed during the remedial design phase. Confirmatory sampling will be conducted during the remedial design phase to ensure that material contaminated above the cleanup criteria is identified and removed.

#53

COMMENT: Only On-site Treatment and Off-site Disposal Alternatives are potentially consistent with requirements of the Pinelands Comprehensive Management Plan. [WR-00017(1)].

RESPONSE: See response to Comment #41 in this section.

#54

COMMENT: The remediation process proposed through the On-site Treatment and Off-site Disposal Alternative would require the completion of an application with the Commission for a permit equivalency. [WR-00017(1)].

RESPONSE: See response to this Comment #54 under Section 02.03.

#61

COMMENT: A remedial cleanup strategy that will safeguard the health and well-being of the residents of the area and prevent further environmental degradation include the Off-site Disposal and the On-site Treatment Alternatives. [WR-00018(1)].

RESPONSE: The Air Force Preferred Alternative is off-site disposal, which would remove the source of contamination and eliminate any long-term health threat. Other alternatives evaluated in the EIS, with the exception of the Unrestricted Access Alternative, are considered to be reasonable alternatives.

#119,216

COMMENT: Page 5-18; Although we do not consider these contaminants to be Low Level Radioactive Waste (LLRW), the New Jersey Low Level Radioactive Waste Disposal Facility siting Act prohibits the construction of a LLRW disposal site in the Pinelands, and thereby could be construed as a State policy regarding the disposal of other radioactive waste in the Pinelands. In light of this, why does the Air Force present on-site treatment as an option? [WR-00022(5), WR-00025(6)].

RESPONSE: The Air Force has evaluated the On-site Treatment Alternative and considers it to be a reasonable option. Under this alternative, contaminated soil would be treated and decontaminated to a specified level. Any contaminated material that could not be treated to the requisite level would be disposed of off-site at a licensed low-level radioactive waste disposal facility.

#129

COMMENT: On-site treatment entails treating excavated soils using the TRU-Clean[®] process or a similar process and restoring the site by backfilling the "clean" fraction from the Tru-Clean[®] process and other clean fill as needed. It is important to recognize that in addition to radioactive constituents, VOC's have been identified in soil at the site. If this alternative is the selected remediation, EPA recommends that appropriate air modelling be performed to estimate the air

quality impacts of VOC's that may be released during operation of the TRU-Clean^R process or that remain in the soil used for backfill.

Similarly, the extent and nature of chemical contamination and the effects that such contamination may have on remediation efforts should be clarified (e.g., problems that the presence of VOC's may create if the on-site treatment option is ultimately chosen). This is especially important in regard to the final characterizing of the waste generated for disposal. [WR-00024(3)].

RESPONSE: Soil samples obtained in the area to be remediated had a maximum of 27 parts per billion acetone (Table 4-26 of the RI/FS). These levels of acetone will not pose problems for remedial efforts and do not require modelling to estimate air impacts. The nature and extent of chemical contamination at the site is the subject of a separate, on-going investigation.

#169,173

COMMENT: Reference to Section 5.1.3.5; Information has not been provided documenting that Pu-239 and Am-241 behave similarly in the TRU-Clean^R process. As stated in our October 28, 1991 comments on the EIS, all results of the test soils have been evaluated in terms of Am-241 activity. The resultant Pu-239 activity needs to be analytically verified if the TRU-Clean^R process is to be used. [WR-00024(13), WR-00024(14)].

RESPONSE: Documentation does exist as to the effectiveness of the TRU-Clean process at other sites.

#217

COMMENT: Reference to Section 5 - Alternative Remedial Measures; Alternative 6, off-site disposal, as well as alternative 5, must include institutional controls such as deed restrictions to prevent the use of groundwater should the facility be sold. [WR-00025(6)].

RESPONSE: The Air Force cannot sell property unless contamination is remediated; essentially, deed restrictions are already in place.

#219

COMMENT: Reference to Section 5 (RI/FS) - Alternative Remedial Measures, Page 5-59, Paragraph 5; The results of any treatability studies using site specific soils should be presented (such an effort was indicated to have occurred on Page 4-101 and 5-59). Information such as that presented on Page 5-47, Paragraph 4 is required at a minimum. Subsequently, a projection of the level of contamination that will remain in the soil that is to be redeposited on-site should also be made. [WR-00025(6)].

RESPONSE: A reference is made to Page 5-47 in the final RI/FS.

03.05 OFF-SITE DISPOSAL

#22

COMMENT: Contamination should be removed. Maintaining site control for 24,000 years may not occur. [WR-00006(1)].

RESPONSE: All contamination above the cleanup criterion will be removed under off-site disposal, the Preferred Alternative.

#40

COMMENT: Concerns sedimentation and erosion control. [WR-00014(3)].

RESPONSE: See response to Comment #40 under Section 03.04.

#41

COMMENT: Off-site disposal or on-site treatment should be the alternatives that are suggested. A site-specific contingency plan should be considered. [WR-00014(4)].

RESPONSE: See response to Comment #41 under Section 03.04.

#53

COMMENT: Only alternatives 4 and 5 are consistent with the Pinelands Comprehensive Management Plan. [WR-00017(1)].

RESPONSE: See response to Comment #53 under Section 03.04.

#54

COMMENT: The remediation process proposed under alternatives 4 and 5 requires completion of an application with the commission for a permit equivalency. [WR-00017(1)].

RESPONSE: See response to Comment #54 under Section 02.03.

#61

COMMENT: On-site treatment or off-site disposal options should be selected. [WR-00018(1)].

RESPONSE: See response to Comment #61 under Section 03.04.

#217

COMMENT: Off-site disposal, as well as alternative 5, must include institutional control or deed restrictions. [WR-00025(6)].

RESPONSE: See response to Comment #217 under Section 03.04.

#220

COMMENT: Reference to Section 5 (RI/FS) - Alternative Remedial Measures, Page 5-64, Paragraph 1; Because only wastes less than 100 nCi/g are being accepted by the disposal facilities, it may be prudent in the Off-site Disposal Alternative to develop contingency planning for decontaminating the missile launcher or other large items which may be heavily contaminated and require disposal. [WR-00025(6)].

RESPONSE: Standard procedures in effect at the time of the accident would have been to dispose of the launcher and other contaminated debris from the shelter for disposal as waste. However, if the missile launcher or any other items are located and if they prove to be highly contaminated, a contingency plan would be developed during the remedial design phase for disposing of the contamination.

#5,27,63,81,96

COMMENT: Off-site Disposal Alternative is suggested. [OR-0001(31,32)], [WR-00009(1), WR-00019(1), WR-00021(1), WR-00022(1)].

RESPONSE: Off-site disposal is the Preferred Alternative selected by the Air Force.

04 AFFECTED ENVIRONMENT AND IMPACTS

04.01 GEOLOGY AND SOILS

#43

COMMENT: The draft EIS does not discuss whether Pu-239 and Am-241 act similarly in the "TRU-Clean" process. [WR-00014(4)].

RESPONSE: We know of no specific studies that have differentiated between the behavior of Pu-239 and Am-241 and the TRU-Clean Process. However, other studies have shown TRU-Clean as effective for removing both plutonium and americium.

#44

COMMENT: Question concerns the type of plutonium compound present at the site and how it compares to historical velocities. [WR-00014(4,5)].

RESPONSE: See response to Comment #'s 43 and 44 under Section 02.02.02.02.

04.02 HYDROLOGY/GROUNDWATER

#11

COMMENT: There is a concern that plutonium at the site could contaminate drinking water. [WR-00004(1)].

RESPONSE: A detailed investigation of the nature and extent of contamination has not revealed any immediate threat to the drinking water supplies or public health. The Off-site Disposal and On-site Treatment Alternatives would eliminate any long-term threat by removing the source of contamination. Long term monitoring activities would continue under the NEPA No Action and the Limited Action Alternative.

#132,133

COMMENT: These questions address groundwater flow, well usage, and monitoring on-site. [WR-00024(4,5)].

RESPONSE: See response to Comment #'s 132, 133 under Section 02.02.02.01.

#140

COMMENT: A survey should be conducted to identify natural or man-made drainages which could influence groundwater flow. [WR-00024(6)].

RESPONSE: See response to Comment #140 under Section 02.02.02.01.

#1

COMMENT: There is a concern that plutonium on-site presents a threat to groundwater. [OR-00001(14)].

RESPONSE: A detailed investigation of the nature and extent of contamination has not revealed any threat to groundwater. The Off-site Disposal and On-site Treatment Alternatives will eliminate any possible long-term threat by removing the source of contamination. Long term monitoring activities would continue under the NEPA No Action and the Limited Action Alternative.

#3

COMMENT: Has there been any migration of contaminants into Cohansey aquifer? [OR-0001(16)].

RESPONSE: There was no indication of migration of contaminants that was uncovered during the RI/FS.

#91,92

COMMENT: There is a concern for interaction of plutonium with groundwater and suspended solids.
[WR-00021(3)].

RESPONSE: See response to Comment #'s 30, 38, 91, 94, 109, 110, 188 and 189.

#32,93

COMMENT: Additional information regarding the gross alpha and beta activity on groundwater in the Pinelands is needed. [WR-00011(1), WR-00021(3)].

RESPONSE: This information has been developed and included in the final RI/FS.

#94

COMMENT: There is a general concern over the presence of plutonium and decay products in groundwater. [WR-00021(3)].

RESPONSE: See response to Comment #'s 30, 33, 91, 94, 109, 110, 188 and 189 under Section 02.02.02.01.

04.03 METEOROLOGY AND AIR QUALITY

#129

COMMENT: Air quality modeling is recommended to estimate air quality impact of VOC's.
[WR-00024(3)].

RESPONSE: See response to Comment #129 under Section 03.04.

04.04 BIOLOGY

04.04.01 ECOLOGICAL INVENTORY

#125

COMMENT: The ecological inventory of the area was comprehensive. [WR-00023(1)].

RESPONSE: The comment was noted.

04.04.02 BIOLOGICAL TRANSMISSION OF PLUTONIUM

#126

COMMENT: The discussion on biological transmission of plutonium (EIS Section 3.5.5) neglects to include potential assimilation of radioisotopes by small mammals (e.g shrews, mice, moles, etc.) or their predators (e.g., hawks and falcons). A review of the scientific literature available on trophic transport of the radioisotopes of concern (similar to the discussion which is provided in Section 3.5.5 for the transfer of radioisotopes from plants to herbivorous organisms) would be appropriate. That type of review should assess various pathways of contamination for small mammals (dermal contact, soil ingestion, etc.) , the overall significance of the current soil contamination to small mammals, and the significance of food chain transfer of radioactive contamination to avian predators. This is due to the fact that the planned biological sampling at the site, which would address the bioassimilation concern directly, was largely unsuccessful (only one organism was obtained for analysis) [WR-00023(1)].

RESPONSE: Section 3.5.5 references a study (Hakonson and Nyham, 1980) that showed very low uptake of plutonium from contaminated soil by rodents (mass inventory ratio of 1.5×10^{-9}). This reported low uptake is supported by the analysis of tissue from the rodent that was trapped at the BOMARC Missile Site. Also, the fact that only a single rodent was trapped suggest a low density of rodents at the BOMARC Missile Site. Finally, plutonium contamination such as at the BOMARC Missile Site typically exists in discrete particles, rather than as more diffused areas of contamination. This minimizes the volume of soil actually contaminated. These points suggest that potential uptake of plutonium from soil at the BOMARC Missile Site by rodents is insignificant.

04.04.03 THREATENED AND ENDANGERED SPECIES

#127,178

COMMENT: The Air Force should consult informally with the U.S. Fish and Wildlife Service (USF&WS) to determine whether a threatened or endangered species are present in the study area. [WR-00023(1,2), WR-00024(15)].

RESPONSE: US F&WS review was provided January 1992. Some of the revisions identified in the review comments were incorporated into the EIS text and Volume 3, Appendix 4.

04.05 LAND USE

04.05.01 N. J. PINELANDS MANAGEMENT PLAN

#53

COMMENT: The Pinelands Management Plan should be considered as an ARAR. [WR-00017(1)].

RESPONSE: See response to Comment #53 under Section 02.02.02.06.

#54

COMMENT: The Off-site Disposal and On-site Treatment Alternatives would require the completion of an application with the Pinelands Commission for permit equivalency. [WR-00017(1)].

RESPONSE: See response to Comment #54 under Section 02.03.

#55

COMMENT: Wastewater must be treated so that water quality is not degraded. [WR-00017(1)].

RESPONSE: See response to Comment #55 under Section 02.03.

#56

COMMENT: Restoration of the site following any remediation must utilize soils and plants indigenous to the Pinelands. [WR-00017(2)].

RESPONSE: Under any alternatives requiring remediation, the Air Force would restore the site with soils and plants indigenous to the Pinelands.

#57

COMMENT: Uncontaminated demolition materials generated during site remediation cannot be disposed of on-site. No disposal of any radioactive contaminated material is permitted in the Pinelands area. [WR-00017(2)].

RESPONSE: No contaminated materials would be disposed of on-site under any alternative. On-site Treatment provides for treatment of contaminated materials to achieve a specified clean up goal.

#58

COMMENT: The Pinelands Commission office should be notified once the Preferred Alternative is determined to obtain specific application requirements [WR-00017(2)].

RESPONSE: The Air Force will obtain all the federal and state and local permits that are required to implement any alternative selected.

#59

COMMENT: The Pinelands Commission views the prompt remediation of the site as essential to protect the resources of the Pinelands as mandated by the National Parks and Recreation Action of 1978 and the Pinelands Protection Act. [WR-00017(2)].

RESPONSE: Implementation of the Preferred Alternative (off-site disposal) will ensure protection of resources in the Pinelands.

#119,216

COMMENT: Why does the Air Force present on-site treatment as an option when the New Jersey Low Level Radioactive Waste Disposal Facility Act prohibits the construction of a LLRW disposal site in the Pinelands? [WR-00022(5), WR-00025(6)].

RESPONSE: See response to Comment #119 under Section 03.04.

04.05.02 FARMLANDS PRESERVATION

#180

COMMENT: A determination should be made of the presence or absence of, and direct or indirect impact on, significant agricultural lands, pursuant to the Farmland Protection Policy Act of 1981 and the Farmland Protection Policy. The Soil Conservation Service and the local Soil Conservation District should be contacted. [WR-00024(15)].

RESPONSE: Information on prime agricultural lands has been obtained. The impact of each of the alternatives on prime agricultural lands has been included in the FEIS.

04.05.03 WETLANDS

#24

COMMENT: A Department of the Army permit would be required prior to any site work which may impact a cedar swamp habitat within the study area. [WR-00007(1)].

RESPONSE: See response to Comment #24 under Section 02.03.

04.06 CULTURAL RESOURCES

#8,179

COMMENT: A determination should be made whether the site contains National Register archaeological resources. [WR-00001(1), WR-00024(15)].

RESPONSE: A brief discussion has been added to Chapter 1 of the EIS outlining the rationale for limiting the analysis of potential impacts to cultural resources. Due to the heavily disturbed nature of the site and the small area, it is unlikely that any archaeological or cultural resources exist. The Off-site Disposal Alternative would not disturb any previously undisturbed areas. The Air Force has initiated the Section 106 process and it will be completed prior to initiating remedial action.

#1

COMMENT: It is true that there is no threat that the plutonium on-site will leach into groundwater and expose the public? [OR-00001(14)].

RESPONSE: There is no immediate threat of exposure. Implementation of the Off-site Disposal or On-site Treatment Alternatives would eliminate any possible long-term threat by removing the source of contamination. Long term monitoring of the site would continue under the NEPA No Action and the Limited Action Alternatives. Monitoring would include groundwater sampling.

#45

COMMENT: In discussing occupational health, the draft EIS refers to "negligible" levels of radiation. Radiation protection involves the use of a nonthreshold linear response curve; therefore, all exposures would have an impact. The "as low as reasonably achievable" (ALARA) philosophy is the appropriate criteria for occupational health and should be considered when developing measures to limit occupational impacts. [WR-00014(5)].

RESPONSE: ALARA is not a criterion for occupational radiation protection, but a philosophy to be employed in the conduct of work. In addition to regulatory limits, the ALARA principle would be integrated into all work conducted at the BOMARC Missile Site, regardless of the alternative selected. This is further discussed in the FEIS.

#70

COMMENT: Explanations should be provided on the possible current location of the residual radionuclides and on the potential health impacts associated with exposure to the extremely large quantity of uncontrolled radioactivity (associated with 1000 and 1500 grams of WGP). The dose and risk estimates for the BOMARC Missile Site, presently based on less than one percent (e.g. seven grams) of the missing WGP, maybe substantially understated. [WR-00020(4)].

RESPONSE: A baseline risk assessment was conducted in order to quantify risks to human health and the environment. Risks were estimated for both offsite populations and for a hypothetically maximal exposed individual (HMEI) residing onsite. For this worst-case scenario, it is assumed that all unaccounted contamination is associated with the missing launcher; the HMEI is exposed upon inadvertently constructing a house at the missing launcher disposal site.

DOE and Air Force scientists have prepared an unclassified account of the upper limited of the quantity of plutonium that could be at the site. This maximum estimate of 300 grams is discussed in Appendix 2-5 of Volume 2 of the EIS.

#148

COMMENT: Sieving particles into >20 microns and <20 microns size does not adequately address the respirability of Pu contaminated materials. Particles of <10 microns are particularly respirable into the bronchiole and alveoli. [WR-00024(7)].

RESPONSE: The 20 micron size is a mechanical limitation; smaller sieves were not available.

05 MITIGATION MEASURES

05.01 MONITORING/SAMPLING

#10,19,20,28,52,62

COMMENT: Monitoring/sampling of various media to detect and prevent further migration/contamination and notification of regulatory agencies if migration occurs should be conducted. [WR-00003(1), WR-00005(1), WR-00006(1), WR-00009(1), WR-00016(1), WR-00018(2)].

RESPONSE: Long-term monitoring of the site would be conducted under the Off-site Disposal, NEPA No Action, Limited Action, and On-site Treatment Alternatives.

05.02 RESTRICTED ACCESS/INSTITUTIONAL CONTROLS

#16

COMMENT: Fence the area with adequate buffers. [WR-00005(1)].

RESPONSE: Under the NEPA No Action or Limited Action Alternatives, the area would be fenced; under the On-site Treatment or Off-site Disposal Alternatives, soils contaminated above cleanup criteria would be remediated.

#28

COMMENT: Restricted access to the site be maintained [WR-00009(1)].

RESPONSE: See response to Comment #16 above.

#37

COMMENT: The ponding area just to the west of Route 539 is not presently capped nor is it separated from the roadway by security fencing. [WR-00014(2)].

RESPONSE: The FEIS includes information on management and operational strategies relative to the ponding area and culvert. Under the NEPA No Action or Limited Action Alternatives, the ponding area would be fenced; under the On-site Treatment or Off-site Disposal Alternatives, soils contaminated above cleanup criteria would be remediated.

#94,203,217

COMMENT: The proposed remedial alternative must include provisions for institutional controls at the site to prevent the use of groundwater should the facility be sold in the future. [WR-00021(4), WR-00025(4), WR-00025(6)].

RESPONSE: The Air Force does not currently anticipate transfer of the site. If transfer of ownership of the site is anticipated, the Air Force would evaluate the need for appropriate institutional controls at the time of transfer, and controls would be adopted.

#167

COMMENT: Reference to Section 5.1.2.2 (RI/FS); A site visit conducted by Region II personnel revealed that contaminated areas are not consistently posted and, based on trash and graffiti in the area of the site, that unauthorized access to the site has occurred. Also, existing fences are rusted and in a state of disrepair. Lastly, regular patrols of this area by Military Police have been discontinued because of budget cutbacks. Thus, it appears that existing conditions are not as stated in this section. [WR-00024(13)].

RESPONSE: Patrols by military police have been cut back, but not eliminated, due to budget cutbacks. Contaminated areas of the site will be properly fenced and posted until an alternative has been selected and implemented.

#168

COMMENT: Reference to Section 5.1.3.2; Additionally, Regional personnel did not see signs posted every 50 feet as stated in this section. [WR-00024(13)].

RESPONSE: Noted.

#172

COMMENT: As described in our comments on Section 5.1.2.2. and 5.1.3.2, the statement that "maintenance of the physical barriers... is easily accomplished appears to be inconsistent with the existing site conditions. [WR-00024(14)].

RESPONSE: See response to Comment #167 above.

05.03 DUST/SEDIMENTATION CONTROL

#40

COMMENT: The draft EIS indicates that the Off-site Disposal and On-site Treatment Alternatives include excavation of contaminated soils and ditch sediments as part of the remediation effort. The draft EIS correctly notes that soil erosion may occur during remediation due to movement of wind and water across the site; however, plutonium migration rates and measures to minimize their movement are not discussed. To correct this, documentation should be provided which describes erosion and sedimentation control plans to prevent the transport of sediments and attached radionuclides off-site. Additionally, efforts should be made to accurately define the depth of soil contamination on localized portions of the site so that all contaminated material is identified and removed. [WR-00014(3)].

RESPONSE: The Mitigation Measures Section of the EIS identifies several activities that would be incorporated into remedial design specifications to minimize erosion during any

site activities. An erosion and sediment control plan would be developed during the remedial design phase of either the Off-site Disposal or On-site Treatment. Confirmatory sampling would be conducted during the remedial action phase to insure contaminated material is identified and removed.

#131,170

COMMENT: Due to the risk involved, comprehensive measures must be taken to suppress dust generation during excavation and treatment. We recommend that a dust control plan be included in future documents. The federal and state regulations governing hazardous waste piles and landfills are aimed at control of wind entrainment and dispersal of dust. Any waste piles of contaminated material at the site should be treated in a manner consistent with the requirements of these regulations, including: RCRA Standards for control of fugitive dust emissions 40 CFR 264 Part 251 (Design and operating requirements), Part 254 (Monitoring and inspection), and Part 301 Subpart N (Landfills: Design and operating requirements); and NJAC 7:26 Solid Waste Regulations Part 7:26-10.8 (Hazardous Waste Landfills). Most of the treatment options and all of the disposal options envision some excavation. Every available precaution should be undertaken to prevent dispersal of the radioactive material. [WR-00024(3),WR-00024(14)].

RESPONSE: As noted in the Mitigation Measures Section of the EIS, a dust control plan would be incorporated into the remedial design documents, as appropriate.

#175

COMMENT: Reference to Section 5.3.5 (RI/FS); Detail should be provided as to how engineering controls will address the potential chemical contaminants that may be at the site. [WR-00024(14)].

RESPONSE: See response to Comment #202 in Section 02.02.02.01.

#176

COMMENT: Reference to RI/FS Appendix B - Section 1.2.4.2; The RI/FS mentions that a temporary enclosure for Shelter 204 will be erected to prevent the release of contaminated material into the environment during removal of loose debris and borehole field investigations. At the time of a site visit by EPA staff, it was evident that no such enclosure had yet been erected. Future reports should state when this enclosure will be built. [WR-00024(14)].

RESPONSE: The temporary enclosure referred to was, in fact, erected in the summer of 1989 during removal of loose debris and borehole investigations. Upon completion of these investigations, the temporary enclosure was dismantled and disposed of at a licensed radioactive waste disposal facility. The EPA oversight contractor observed and photographed this temporary enclosure while it was in place, and this information should be in Region II EPA files.

05.04 RESTORATION/REVEGETATION

#56

COMMENT: Restoration must use soils and plants indigenous to the Pinelands. [WR-00017(2)].

RESPONSE: See response to Comment #56 under Section 04.05.01.

#125

COMMENT: Impacted environment will be restored to pre-disturbance status. [WR-00023(1)].

RESPONSE: Noted.

05.05 HEALTH STUDIES/MONITORING

#18

COMMENT: If areas of contamination in air, soil, surface or groundwater are discovered off-site, a health study of any exposed individuals should be undertaken [WR-00005(1)].

RESPONSE: To date, studies do not indicate contamination to air, soil, surface or groundwater outside the site boundaries

#21

COMMENT: A health study of those people actually exposed to the site should be conducted. [WR-00006(1)].

RESPONSE: Issues related to the status and condition of individuals who were involved in the fire suppression effort and subsequent cleanup activities which occurred in the 1960s are not related to or affected by the proposed action. No studies of this nature were conducted as part of the RI/FS or EIS process.

#6

COMMENT: Have any health studies been conducted on people who were potentially exposed at the time of the accident? [OR-00001(17)].

RESPONSE: See previous response above.

06 REQUEST FOR ADDITIONAL INFORMATION

#48

COMMENT: Based on Agency review, and in accordance with EPA policy, the draft EIS as EC-2, indicating that there are environmental concerns (EC) associated with the proposed project. Specifically, the draft EIS does not identify a Preferred Alternative nor is it clear that an appropriate cleanup level for the radioactive material has been established. Implementation of the alternatives may impact air and water quality. Accordingly, additional information is requested to address these issues. [WR-00014(5,6)].

RESPONSE: Off-site disposal is the Air Force Preferred Alternative. An appropriate cleanup level has been established with the concurrence of EPA. See Comment #128 for a full discussion. Remedial design activities would identify and document specific measures that would be implemented during remedial action.

#65

COMMENT: The Air Force should also provide summary tables for data collected during all radiation surveys conducted at the BOMARC Missile Site since 1960. We recommended that the tables include: numbers, types, locations, and concentrations for media samples; external gamma exposure rate measurements; descriptions of field and analytical procedures and lower limits of detection; and QA/QC measure. [WR-00020(2)].

RESPONSE: Summary tables for radiation surveys conducted in support of the RI/FS are included as appendices in the RI/FS.

#32,93

COMMENT: Additional information regarding the gross alpha and beta activity in groundwater in the Pinelands is needed. [WR-00011(1), WR-00021(3)].

RESPONSE: The Air Force has conducted additional sampling to determine the identity and source of elevated gross alpha and beta activity. The data has been incorporated into the RI/FS.

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APPENDIX 2-4

INDEX OF COMMENTS AND COMMENTORS

INDEX OF COMMENTS AND COMMENTORS

An index to comments is provided in this appendix. Comment categories that were identified in Appendix 2-3 are listed sequentially. An index of commentors on the Draft Environmental Impact Statement is also provided in this appendix. Each document presented in the Transcript of the Public Hearing (Appendix 2-1) and the Public Comments (Appendix 2-2) has been assigned a unique identification number. These source documents and commentors are identified here.

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| 01 | WR-00013 | 1 | #35 | N.J. Dept. of Environmental Protection and Energy |
| 01 | WR-00014 | 5 | #46 | U.S. Environmental Protection Agency |
| 01 | WR-00017 | 2 | #58 | N.J. Pinelands Commission |
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| 02 | WR-00004 | 1-2 | #12 | W. Reed Kindermann, M.D. |
| 02 | WR-00005 | 1 | #13 | N.J. Assemblyman Robert C. Shinn, Jr. |
| 02 | WR-00012 | 2 | #59 | N.J. Pinelands Commission |
| 02 | WR-00012 | 1 | #34 | U.S. Congress, Rep. H. James Saxton |
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| 02 | WR-00018 | 1 | #60 | N.J. State Senator Leonard T. Connors, Jr. |
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| WR-00012 | U.S. Congress, Rep. H. James Saxton |
| WR-00013 | New Jersey Department of Environmental Protection and Energy and Energy |
| WR-00014 | United States Environmental Protection and Energy Agency |
| WR-00015 | New Jersey Congressional Delegation U.S. Congress, Rep. H. James Saxton U.S. Congress, Rep. Bernard J. Dwyer U.S. Congress, Rep. Robert G. Torricelli U.S. Congress, Rep. Chris H. Smith U.S. Congress, Rep. Frank Pallone, Jr. U.S. Congress, Rep. Robert A. Roe U.S. Congress, Rep. Dean Gallo U.S. Congress, Rep. Robert E. Andrews U.S. Congress, Rep. Mathis Rinaldo U.S. Congress, Rep. William J. Hughes U.S. Congress, Rep. Frank J. Guarini U.S. Congress, Rep. Donald M. Payne U.S. Congress, Rep. Marge Roukema U.S. Congress, Rep. Richard A. Zimmer |
| WR-00016 | Department of the Army - Fort Dix |
| WR-00017 | The New Jersey Pinelands Commission |
| WR-00018 | Ninth District (New Jersey) State Legislative Delegation New Jersey Assemblymen Jeffrey W. Moran and Christopher Connors, and State Senator Leonard T. Connors, Jr. |
| WR-00019 | New Jersey Department of Environmental Protection and Energy |
| WR-00020 | United States Environmental Protection Agency |
| WR-00021 | New Jersey Department of Environmental Protection and Energy |
| WR-00022 | New Jersey Department of Environmental Protection and Energy |
| WR-00023 | United States Department of the Interior |
| WR-00024 | United States Environmental Protection Agency |
| WR-00025 | New Jersey Department of Environmental Protection and Energy |

APPENDIX 2-5

**SUMMARY OF DISPOSITION OF RADIOACTIVE
MATERIALS FROM THE BOMARC MISSILE SITE**

SUMMARY OF DISPOSITION OF RADIOACTIVE MATERIALS FROM THE BOMARC MISSILE SITE

During the initial incident, Explosive Ordnance Disposal personnel filled seven metal containers with residues from the nuclear warhead. This followed established procedures for recovering materials and components and for ensuring the proper protection of vital information. According to a report prepared by the Los Alamos National Laboratory, the containers were stored at the Medina facility in San Antonio, Texas until 1965 and then transferred to the Pantex facility at Amarillo, Texas. The containers were apparently transferred to the Nevada Test Site in the early 1980s.

Scientists from the Los Alamos National Laboratory studied the containers during 1979 to 1982 using a variety of nuclear measurements techniques to assess the amounts of radioactive materials present in each. The results of these analyses show that most of the weapons grade plutonium (WGP) was recovered. The amount of unrecovered WGP remaining on the site was estimated at about 60 grams. This residual quantity is subject to analytical uncertainties from the measurement process and other factors. The most probable error for the estimated residual amount is much larger than the quantity itself. Considering all of these factors leads to a conservative estimate for an upper limit to the residual amount of 300 grams. This analysis supports conclusion about the fate of the WGP from the accident. First, the major portion of the WGP was recovered and returned to the Atomic Energy Commission, now the Department of Energy (DoE). The remainder of the WGP was distributed on the site from the initial incident and response actions taken at the time. The residual WGP essentially remains in the environment of Building 204 and the remainder of the site.

Reference: LA9696-MS, Measurement of Nuclear Weapons Accident Residues Stored in Containers, Phase I, J.T. Caldwell, J.M. Bieri, and H.H. Hsu, Los Alamos National Laboratory, May 1983.

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APPENDIX 2-6

**CONSULTATION LETTERS AND OTHER
RELEVANT DOCUMENTS**



DEPARTMENT OF THE AIR FORCE

HEADQUARTERS MILITARY AIRLIFT COMMAND

SCOTT AIR FORCE BASE, ILLINOIS 62225

30 APR 1992

U.S. Ecology
PO Box 638
Richland, Washington 99352

Dear Sir

The Air Force is nearing completion of a remedial investigation/feasibility study (RI/FS) on the BOMARC Missile Site near McGuire AFB NJ. A fire in 1960 partially consumed Shelter 204 and its missile and warhead. During fire fighting activities, plutonium from the warhead was dispersed to the environment. The preferred alternative for site remediation is excavation and off-site disposal. Would your facility in Hanford, Washington be capable of accepting this material for disposal?

The material requiring disposal includes soil, structural steel, concrete, and asphalt. We have attached details concerning the volumes and activity levels. We hope to start excavation before the end of the calendar year, but cannot provide specific dates. We are negotiating with the regulators to do performance specifications instead of a formal remedial design for this project. This affects our time frame. It is unlikely that we will complete excavation before January 1993 when the Low Level Radioactive Waste Policy Amendments Act of 1985 becomes effective. Can you accept the material for disposal after this date?

At your request, we will forward a copy of the RI/FS for your information. If your staff has any questions, please have them contact Ms Sharon Geil at (618) 256-5763.

Sincerely

Harry R. McDaniel

HARRY R. MCDANIEL, Colonel, USAF
Director, Environmental Management
DCS/Logistics and Engineering

1 Atch
Waste Specifications

cc: HQ USAF/CEV

BOMARC MISSILE SITE

Volumes, Types, and Activity Ranges of Radioactive Wastes

| <u>Waste Type</u> | <u>Volume</u> | <u>Maximum Activity</u> | <u>Measurement Method</u> |
|----------------------------|-----------------------|----------------------------------|---------------------------|
| Soil | 6,200 yd ³ | 1,400 pCi/g | Alpha Spectroscopy |
| Concrete/ Asphalt/Steel | 1,500 yd ³ | 1,070 μ Ci/Core ¹ | HPG ² |

1. The highest value of 1,070 μ Ci was obtained by scanning a concrete coring weighing approximately 25 lbs. Concrete is the most contaminated material onsite; asphalt and steel are orders of magnitude less contaminated.
2. HPG = Hyper-pure germanium detector with multi-channel analyzer.



DEPARTMENT OF THE AIR FORCE

HEADQUARTERS MILITARY AIRLIFT COMMAND

SCOTT AIR FORCE BASE, ILLINOIS 62225

30 APR 1992

U.S. Ecology
9200 Shelbyville Road
Suite 300
PO Box 7246
Louisville, Kentucky 40251-0246

Dear Sir

The Air Force is nearing completion of a remedial investigation/feasibility study (RI/FS) on the BOMARC Missile Site near McGuire AFB NJ. A fire in 1960 partially consumed Shelter 204 and its missile and warhead. During fire fighting activities, plutonium from the warhead was dispersed to the environment. The preferred alternative for site remediation is excavation and off-site disposal. Would your facility in Beatty, Nevada be capable of accepting this material for disposal?

The material requiring disposal includes soil, structural steel, concrete, and asphalt. We have attached details concerning the volumes and activity levels. We hope to start excavation before the end of the calendar year, but cannot provide specific dates. We are negotiating with the regulators to do performance specifications instead of a formal remedial design for this project. This affects our time frame. It is unlikely that we will complete excavation before January 1993 when the Low Level Radioactive Waste Policy Amendments Act of 1985 becomes effective. Can you accept the material for disposal after this date?

At your request, we will forward a copy of the RI/FS for your information. If your staff has any questions, please have them contact Ms Sharon Geil at (618) 256-5763.

Sincerely

Harry R. McDaniel

HARRY R. McDANIEL, Colonel, USAF
Director, Environmental Management
DCS/Logistics and Engineering

1 Atch
Waste Specifications

cc: HQ USAF/CEV



DEPARTMENT OF THE AIR FORCE

HEADQUARTERS MILITARY AIRLIFT COMMAND

SCOTT AIR FORCE BASE, ILLINOIS 62225

30 APR 1992

Chem Nuclear
P.O. Box 726
Barnwell, South Carolina 29812

Dear Sir

The Air Force is nearing completion of a remedial investigation/feasibility study (RI/FS) on the BOMARC Missile Site near McGuire AFB NJ. A fire in 1960 partially consumed Shelter 204 and its missile and warhead. During fire fighting activities, plutonium from the warhead was dispersed to the environment. The preferred alternative for site remediation is excavation and off-site disposal. Would your facility in Barnwell, South Carolina be capable of accepting this material for disposal?

The material requiring disposal includes soil, structural steel, concrete, and asphalt. We have attached details concerning the volumes and activity levels. We hope to start excavation before the end of the calendar year, but cannot provide specific dates. We are negotiating with the regulators to do performance specifications instead of a formal remedial design for this project. This affects our time frame. It is unlikely that we will complete excavation before January 1993 when the Low Level Radioactive Waste Policy Amendments Act of 1985 becomes effective. Can you accept the material for disposal after this date?

At your request, we will forward a copy of the RI/FS for your information. If your staff has any questions, please have them contact Ms Sharon Geil at (618) 256-5763.

Sincerely

Harry R. McDaniel

HARRY R. MCDANIEL, Colonel, USAF
Director, Environmental Management
DCS/Logistics and Engineering

1 Atch
Waste Specifications

cc: HQ USAF/CEV



DEPARTMENT OF THE AIR FORCE

HEADQUARTERS MILITARY AIRLIFT COMMAND

SCOTT AIR FORCE BASE, ILLINOIS 62225

7 MAY 1992

Enviro-Care of Utah, Inc.
215 South State Street, Suite 1160
Salt Lake City, Utah 84111

Dear Sir or Madam

The Air Force is nearing completion of a remedial investigation/feasibility study (RI/FS) on the BOMARC Missile Site near McGuire AFB NJ. A fire in 1960 partially consumed Shelter 204 and its missile and warhead. During fire fighting activities, plutonium from the warhead was dispersed to the environment. The preferred alternative for site remediation is excavation and off-site disposal. Would your facility in Utah be capable of accepting this material for disposal?

The material requiring disposal includes soil, structural steel, concrete, and asphalt. We have attached details concerning the volumes and activity levels. We hope to start excavation before the end of the calendar year, but cannot provide specific dates. We are negotiating with the regulators to do performance specifications instead of a formal remedial design for this project. This affects our time frame. It is unlikely that we will complete excavation before January 1993 when the Low Level Radioactive Waste Policy Amendments Act of 1985 becomes effective. Can you accept the material for disposal after this date?

At your request, we will forward a copy of the RI/FS for your information. If your staff has any questions, please have them contact Ms Sharon Geil at (618) 256-5763.

Sincerely

HENRY W. CAUGHMAN
Actg Dir, Environmental Management
DCS/Logistics and Engineering

1 Atch
Waste Specifications

cc: HQ USAF/CEV



DEPARTMENT OF THE AIR FORCE

HEADQUARTERS MILITARY AIRLIFT COMMAND

SCOTT AIR FORCE BASE, ILLINOIS 62225

5 MAY 1992

Ms Nancy L. Zerbe
Deputy State Historic Preservation Officer
Department of Environmental Protection and Energy
Natural and Historic Resources
Division of Parks and Forestry
Office of New Jersey Heritage, CN 404
Trenton, New Jersey 08625-8404

Dear Ms Zerbe

Thank you for your comments of 2 October 1991 on the draft environmental impact statement (EIS) for the BOMARC Missile Site at McGuire Air Force Base, New Jersey. The Air Force has identified off-site disposal as its preferred alternative (Atch 1), and we are writing to continue our consultation on this action.

Off-site disposal would entail the removal of shelter 204, excavation of the asphalt and concrete pad in front of the shelter, excavation of contaminated soil (Atch 2), excavation of limited areas in up to five locations in a search for the missing missile launcher (Atch 3), and disposal of materials in an out-of-state licensed radioactive waste repository. The affected area (Atch 4) follows contamination contours closely (Atch 5), and totals approximately 7.5 to 8.5 acres of the BOMARC site, most of which was significantly disturbed during the original construction (Atch 6 and 7).

We have attempted to identify and evaluate historic resources in the affected area (Atch 8). As a result of the relatively small area of effect and extent of previous disturbance, we feel that the probability of impacting archaeological resources is very low.

The significance of BOMARC shelter 204 itself is a more complex issue, but present information indicates that shelter 204 is unlikely to be eligible for the National Register. According to our technical advisors at the National Park Service (NPS), the BOMARC missile system was not a critical element of our defense strategy. Shelter 204 is one of 84 shelters at McGuire, and the McGuire BOMARC site was one of 10 in the U.S. and Canada, of which at least two others remain standing. Shelter 204 is, therefore, unique only in the sense that a fire occurred there, and its contamination makes it a very poor candidate for preservation.

In conclusion, we believe the implementation of the cleanup of BOMARC shelter 204 and related contaminated areas has a low probability of affecting historic resources, and we look forward to your comments on this action. We will send a final EIS and remedial investigation and feasibility study to your office in May. If your staff would like additional information, or would like the opportunity to view the site, our staff will be happy to accommodate you. Please call Dr Robin Burgess, HQ MAC/LEVP, (618) 256-8332, or Ms Sharon Geil, HQ MAC/LEVR, (618) 256-5763, to make arrangements.


HENRY W. CAUGHMAN
Actg Dir, Environmental Management
DCS/Logistics and Engineering

8 Atch

1. Preferred Alternative
2. Areas for Remediation
3. Launcher Locations
4. Contamination
Contours
5. Affected Area
6. Pre-construction
Contour Map
7. Post-construction
Contour Map
8. Identification of
Resources

cc: NPS, Philadelphia
Regional Office
438 SPTG/DEV